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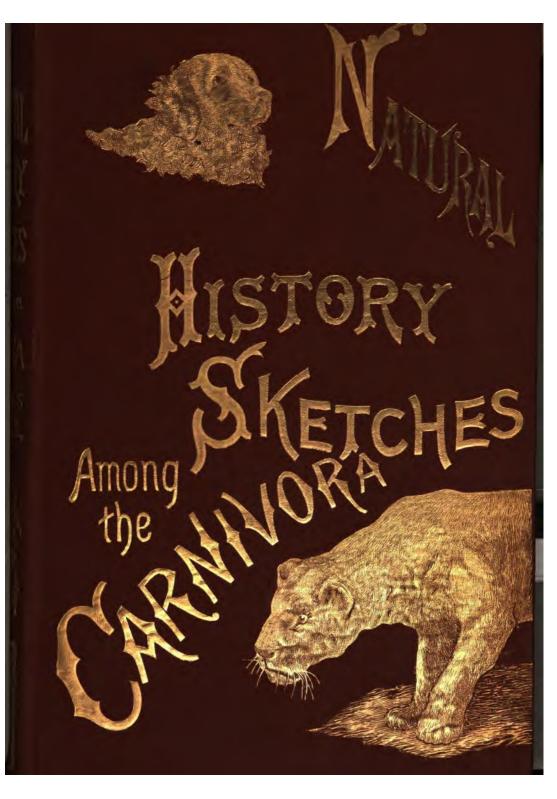
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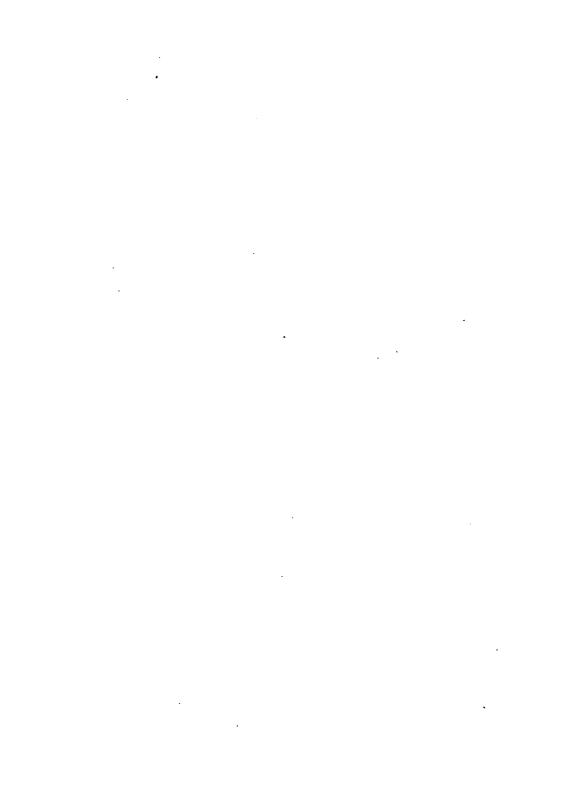


NATURAL HISTORY SKETCHES

AMONG

THE CARNIVORA.





LIONES

LIONESS WATCHING ANTELOPE.

. . (



NATURAL HISTORY SKETCHES

AMONG

THE CARNIVORA:

WILD AND DOMESTICATED.

WITH OBSERVATIONS ON THEIR HABITS AND MENTAL FACULTIES.

BY

ARTHUR NICOLS, F.G.S., F.R.G.S.,

Author of "Zoological Notes," "Chapters from the Physical History of the Earth,"
"The Puzzle of Life and How It has been Put Together," and
"The Acclimatisation of the Salmonidæ at the Antipodes—
its History and Results."

ILLUSTRATED

By J. T. NETTLESHIP, C. E. BRITTAN, AND T. W. WOOD.

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TO MY FRIEND,

J. T. NETTLESHIP,

PAINTER AND NATURALIST,

IN RECOGNITION OF THE HELP DEBIVED FROM HIS

INTIMATE KNOWLEDGE OF THE CHARACTERISTICS AND HABITS OF

THE CARNIVORA;

AND AS A

TRIBUTE OF ADMIRATION FOR HIS MASTERLY DELINEATION OF ANIMALS,

I DEDICATE THIS VOLUME.



PREFACE.

-- NYC DALE-

THE favourable reception accorded, both by the Press and the Public, to my former volume—"Zoological Notes"—emboldens me to hope that the present book may also be acceptable to that large class of cultivated readers who take more than a passing and superficial interest in Natural History.

My grateful acknowledgments must be expressed to those distinguished Naturalists, travellers, artists, and competent observers who have responded to my inquiries on special points; and have furnished me with numerous valuable facts and incidents.

I am indebted also to the correspondence columns of the Field, Nature, and other leading scientific periodicals for illustrations of the life and habits of the Carnivora, both in the wild and domesticated condition; while I must be held personally responsible for extensive extracts from my own note books and memoranda (made whilst every incident and observation recorded was fresh in my memory) extending over a period of twenty-five years.

LONDON, November, 1884.



NATURAL HISTORY SKETCHES

AMONGST

THE CARNIVORA.

CHAPTER I.

Classification of the Carnivora—The Lion: Size, Weight, Strength, and Character; Attacks on Man; Decrepitude and Starvation in Old Age—The Tiger compared with the Lion: Size and Weight; Tiger Hunting, and Strange Adventures; Destruction of Animal and Human Life by Tigers—The Jaguar—The Puma: Encounter with one—The Leopard—Cheetah—Lynx—Hyana.

THE Carnivora, adapted as they may be to a terrestrial or aquatic existence, possess, nevertheless, many structural characteristics which form them into a well-defined order of the Mammalian class. They are solely or partly flesh eaters, while a few, owing to circumstances, may usually subsist on a vegetable diet. The dentition, however, always proclaims them to belong to a group with whom living prey is the indicated food, though some of them may seldom or never obtain it. Thus, many of the herbivorous bears justify their carnivorous structure by devouring animals whenever they have an opportunity. Our old friends who climb the pole at the Zoological Gardens and stand in suppliant attitude, expectant of buns, oranges, and

nuts, would, without doubt, regale themselves on a baby in arms, dropped into their den by a careless nursemaid, as thoroughly as I have seen one of the same species enjoy a present of a sucking pig.

This order of mammals may be divided into three sections, the first containing those that are cat-like, the second those that are dog-like, the third those that are bear-like. Of the cat-like section, which it is now proposed to discuss, we have five families, viz.: the Felidæ, or cats and their allies, exemplified by the lion, tiger, jaguar, cheetah, lynx, &c.; the Hyænidæ, hyænas; the Viverridæ, civets; the Protelidæ, Aard-wolf, of Africa; and the Cryptoproctidæ, the cryptoprocta, all of which are strictly carnivorous and predatory.

Professor Flower, Director of the Natural History Museum, South Kensington, has shown in the following table the mutual relationships of the families:—

ÆLUROIDEA.		CYNOIDEA.	ARCTOIDEA.	
		$\overline{}$		
Felidæ	HYÆNIDÆ.			Ursidæ.
CRYPTOPROCTIDÆ.	PROTELIDÆ.	CANIDÆ.	PROCYONIDÆ.	AILURIDÆ.
Viverridæ.			Mustelidæ.	

The Canidæ constitute the central group, the families to the right and left representing, according to their distance from it, and their position on the first, second, or third line, the degree of structural divergence. Thus, the Felidæ and Ursidæ, at the opposite ends, are most highly modified with respect to the central group, and to each other. The greatest modification is indicated by the upper line, in proportion to distance, and least by the lowest line (Viverridæ and Mustelidæ being least modified), while all on the middle line occupy an intermediate relationship according to distance from the central group.

The land carnivora may be said to take the place among mammals which the Raptores occupy among birds, by virtue of their strength, agility, and the natural weapons furnished them for the capture of their living prey; and, like their aerial representatives, they exhibit the same intolerance of captivity

and untamable disposition. Although in these critical days we know him to be an impostor, scared by the braying of an ass, it is easy to understand why the lion has been exalted to the position of monarch among the beasts of the field. His appearance and carriage are assuredly of that majestic mien, which poetry has associated with royalty, whether or not he always justifies by his conduct the outward show of dignity and conscious power. To this the abundant mane no doubt contributes, while it also gives the impression that he is very much larger than any of his congeners. Perhaps he stands slightly higher than the tiger; at all events, he carries his head more elevated, but he is certainly little, if at all, heavier than a well-grown male tiger, and, in the opinion of those capable of forming a correct judgment, decidedly inferior in strength to his striped first cousin. My friend, Mr. J. T. Nettleship, the well-known animal painter, whose studies must have made him intimately acquainted with the form and proportions of both the lion and tiger, assures me that the balance of muscular development, and even more so the activity, appears to him certainly in favour of the tiger.

The following letter, from one of our most distinguished animal painters, Mr. Briton Rivière, R.A., second to none as a painter of the Felidx, is in answer to my request for an opinion on the comparative development of the lion and tiger, derived from the close observation which the artist's studies must have rendered necessary:—

"My experiences regarding the large cats are purely artistic,

but a few suggestions occur to me.

"The abundant mane, no doubt, does much for the appearance of the lion, because it gives an appearance of loftiness to the skull, and so adds to the human aspect, which is the real basis of all that is grand in the lion; and, I believe, the sole origin of the title of 'King of Beasts.'

"The tuft of hair on the lower jaw is a highly important

adjunct to this human aspect.

"The ridge of bone, which forms the chin in man, is not found in any other animal; and in man its clearness and sharpness mark power, and the want of it a retrogression towards a lower type. "In the lion, perhaps, nothing else gives the human and, therefore, intellectual, and imperial aspect so much as this tuft of hair on the lower jaw. It has no bony prominence behind it—as in man—but it looks like a chin. The ancient Egyptians and Assyrians knew this well, and their sculptors marked this

angle in a lion's face with great precision and effect.

"The tiger, and, in a less degree, the leopard and jaguar, &c., gain much of dignity from this tuft on the lower jaw. But to none of these is given what the lion has, viz., an apparently lofty cranium. I say 'apparently' because this, like his chin, is purely fictitious, the angles of the bone differing little from those of the tiger. But his fictitious forehead and chin are real enough to give him a very noble appearance. In the form and expression of his mouth, also, there exist several quasi human characteristics.

"My own observations and measurements have made me doubt whether the lion does stand 'slightly higher than the tiger.' I should be inclined to place their average heights as the same, viz., about 3ft. at the shoulder. No doubt individuals of both

species sometimes attain a far higher stature.

"I think, as Mr. Nettleship, that the tiger is the stronger.

The average tiger has always seemed to me to be larger in the forearm than the average lion (a very important feature); but here one must be cautious on account of the mane, which, no doubt, makes the lion's arm look smaller than it is. To prove this, you have only to compare a lion with a lioness. The latter generally appears to be more fully developed, just as a man in a jersey always looks stronger than one in a loose coat. Nevertheless, I have little doubt that the muscular volume of a tiger is rather greater than that of a lion, and I should judge that the quality of its fibre is very superior. It is more beautifully hung together than the lion, and is far more flexible and lithe, and seems to have much greater spring in it.

"The tiger is the cat of cats. The lion, though a cat, is stiffer, and its shoulder action, when compared to that of the tiger, is

more like that of a dog.

"In comparing the relative size and development of the lion and tiger, a lioness and tigress should be used. In this case the apparent difference will not be considerable. The real difference is, I think, greater.

"BRITON RIVIÈRE."

It is, of course, no easy matter to obtain trustworthy statistics of size, because the skin is more often measured than the dead beast in the flesh—which alone will give a correct result; and it is still more difficult to obtain the weight, for the simple

à

reason that a weighing machine is not found in the ordinary equipment of the hunter of dangerous game. This question of size has been the occasion of much heartburning, and one is apt to incur the indignation of the jealous sportsman by venturing on any discussion of it. With all humility, then, it may be stated that the dimensions of a well-grown lion may be 10ft. in length over all, 3ft. 8in. in height at the shoulder, and the weight about 500lb. Some accounts, which indicate much larger animals, do not, on examination, prove to be satisfactory.

Like all his tribe, the lion will not waste his strength by downright hunting. He crawls up to his prey and secures it by a sudden impetuous rush, in which for the moment he puts out his whole energy. In the event of failure he rarely endeavours to follow up the quarry, but waits for another opportunity. Livingstone, although he was nearly killed by a lion, speaks with undisguised contempt of "the king of beasts," as the following extracts from his travels show:

"If he is encountered in the daytime he turns slowly round. after first gazing a second or two, walks as slowly away, looking over his shoulder, quickens his step to a trot till he thinks himself out of sight, and then bounds off like a greyhound. As a rule there is not the smallest danger of a lion which is unmolested attacking man in the light. . . . There is less danger of being devoured by them in Africa than of being run over when walking in the streets of London. . . . Nothing that I ever heard of the lion would lead me to attribute to it either the ferocious or noble character ascribed to it elsewhere. He chiefly preys upon defenceless creatures; and frequently, when a buffalo calf is caught by him, the cow rushes to the rescue, and a toss from her often kills him. On the plain south of Sebituane's Ford, a herd of these animals kept a number of lions from their young by the males turning their heads to the enemy. A toss, indeed, from a bull would put an end to the strongest lion that ever breathed." His Majesty, according to the same writer, is fond of calling others to his assistance when

attacking his prey: "It is questionable if a single beast ever engages a full-grown buffalo. Messrs. Oswald and Verdon once saw three lions combine to pull a buffalo down, and they could not accomplish it without a struggle, though he was mortally wounded by a 2oz. ball." The fact that the natives frequently kill the lion with their spears would suggest that he is not nearly so formidable an antagonist as the tiger. I have seen a very large skin in which there were the marks of only two spear wounds, one over the shoulder, and the other through the ribs. The Bushmen are adepts at stalking the lion. When he has been dining sumptuously they hunt stealthily on his trail until they find him sleeping off the effects of his gorge. A poisoned arrow is then discharged from a distance of a few feet, while one of the hunters throws his cloak over the animal's head, and a number of spears are hurled at him during the moment of his surprise and confusion. No tiger, it may be averred, would allow himself to be killed in this primitive fashion by two or three savages armed with such weapons.

The point of the lion's attack seems to be the flank or throat, according to Livingstone's observations, and he does not make use of his weight by springing on the withers or quarters, as we almost always see him represented in pictures. It is difficult to bring oneself to believe the stories told of his immense strength. Writers who assure us that he will "fell an ox or an antelope with a single blow of his paw, break its neck with one crunch of his cruel teeth, and bound off with it to his lair as easily as if he were only carrying a rabbit," must surely be in a romancing mood; and when we are further informed that a lion has been known to leap a wall 9ft. high with a calf in his mouth, we wonder how he managed to dispose of its dangling legs!

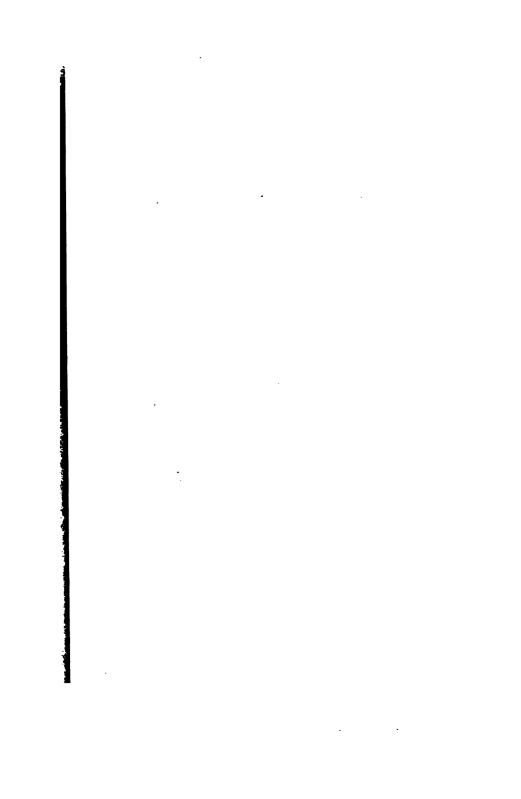
Livingstone's account of the mauling he underwent from a wounded lion shows that the beast may on occasion become a dangerous enemy. That simple-minded missionary and great explorer seems to have done his lion shooting with weapons whose proper place should have been in the hands of ploughboys

scaring off crows from an English cornfield. They are continually referred to in a matter-of-fact way as refusing to go off, an event which happened to the guns of the whole expedition during a night attack by a troop of lions on the draught oxen. None of the celebrated lion killers, though armed with the best weapons of large calibre, have evinced more courage and coolness than the man who marched across Africa with a Bible under his arm, and never took human life, as the following account of an attack on several lions amply proves: "In going round the end of the hill I saw a lion sitting on a piece of rock about thirty yards off, with a little bush in front of him. I took a good aim at him through the bush, and fired both barrels into The men called out, 'He is shot! he is shot!' cried, 'He has been shot by another man, too-let us go to him.' I saw the lion's tail erected in anger, and, turning to the people, said, 'Stop a little till I load again.' When in the act of ramming down the bullets I heard a shout, and looking half-round, saw the lion in the act of springing on me. caught me by the shoulder, and we both came to the ground together. Growling horribly, he shook me as a terrier dog does a rat. The shock produced a stupor similar to that which seems to be felt by a mouse after the first grip of the cat. It caused a sort of dreaminess in which there was no sense of pain nor feeling of terror, though I was conscious of all that was happening. It was like what patients partially under the influence of chloroform describe; they see the operation, but do not feel the knife. This placidity is probably produced in all animals killed by the carnivora; and, if so, is a merciful provision of the Creator for lessening the pain of death. As he had one paw on the back of my head, I turned round to relieve myself of the weight, and saw his eyes directed to Mebalwe, who was aiming at him from a distance of twelve or fifteen yards. His gun, which was a flint one, missed fire in both barrels. The animal immediately left me to attack him, and bit his thigh. Another man, whose life I had saved after he had been tossed by a buffalo, attempted to spear the lion, upon which he turned from Mebalwe and seized this fresh foe by the shoulder. At that moment the bullets the beast had received took effect, and he fell down dead. The whole was the work of a few moments, and must have been his paroxysm of dying rage. In order to take the charm from him, the Bakatla on the following day made a huge bonfire over the carcase, which was declared to be the largest ever seen. Besides scrunching the bone into splinters, eleven of his teeth had penetrated the upper part of my arm." The consequence of this, perhaps, foolhardy encounter with some half dozen lions by men armed with ridiculously untrustworthy weapons, was, so far as Livingstone himself was concerned, "only the inconvenience of a false joint" in his limb.

The varieties of the lion, black-maned and tawny, and those without any mane at all, are probably due to local conditions, the difference in any case being insufficient for establishing a specific distinction. Livingstone found lions, both very old and also in the prime of life, totally destitute of the mane. Besides the difference of colour some individuals have pretty distinct brown spots, principally on the belly and inside the thighs, which are quite conspicuous on all the cubs.

The ravages of lions among the flocks of the natives in Africa seem to be almost as great as the depredations of the tiger in India, although they are certainly much less given to man eating, and that only when old and incapable of hunting. It has been said, on good authority, that a lion in Algeria may be considered to destroy about £200 worth of camels, horses, and oxen, in the course of a year, and if he lives to the age of thirty years the brute will have cost the community no less than £6,000! Pitfalls and ambuscades, therefore, are constructed with considerable skill to put an end to his ravages, and miserable old guns, little better than gaspipes with a touch hole drilled in them, are brought into requisition, with, however, not much effect upon the marauders.

Strictly carnivorous as they are, these great cats appear to





occasionally indulge in vegetable food, either as a medicinal corrective, or because they have a fancy for a change of diet. Thus, they will eat quantities of grass, especially when old, possibly from necessity, and Livingstone mentions their feeding on water melons, even at a time when game was very abundant in the neighbourhood. The paunch of a herbivorous animal, too, containing half digested vegetable matter, is often devoured before any other part of the carcase is touched. It might perhaps be worth while to take these facts into consideration in the treatment of caged felidæ.

The helplessness of old age renders most animals an easy prey to their enemies, but what creature, except man, dares attack the tyrant of the forest, even when time has shorn him of almost all his vigour? Lording it over all creation, as he does when in his prime, the day of retribution for the lion comes at length, and with advancing age and stiffening muscles, the pangs of hunger must be a daily torture to the once powerful beast. Then he sneaks about the villages, content to pick up a mangy dog, or dine on offal, or mayhap strike down some feeble old man or woman loitering homewards in the dusk. But the monarch of the forest may fall even lower than this. Decrepitude is apparent in all his frame; his teeth have decayed, so that he can neither catch nor tear up a zebra or an antelope; his sight and hearing fail him, and the palsied brute quantum mutatus ab illo Hectore—is fain to catch mice and fill his belly with grass, until he gradually sinks under the combined effects of disease and starvation.

I am greatly indebted to my friend, Mr. J. T. Nettleship, whose Indian experience has rendered him familiar with the felidæ in the wild state, for the admirable drawing—taken from one of his life-size oil paintings—which forms the frontispiece to this volume. The lioness is intently watching a herd of antelopes passing through a thicket, with sight, hearing, and smell keenly alive to every movement of the quarry. The attitude, preparatory to gathering herself up for the spring, is finely expressive of reserved power. Mr. F. Babbage, in en-

graving the subject with his accustomed care and skill, has well preserved the artist's touch.

No Indian sportsman will for a moment allow the tiger to be placed in the second rank of the great cats, either as regards beauty, power, or ferocity; and many who have only been enabled to compare them in a state of captivity will not hesitate to give the palm to the striped tyrant of the jungle, notwithstanding the reputation which has been attained by his tawny rival. The old controversy about size — pretty well thrashed out as it has already been - will probably be maintained as long as there is a tiger in existence. Sir Joseph Fayrer points out that the size varies considerably in both sexes, and an error of as much as 12in. may be made by measuring the skin alone. Males of full growth may range from 9ft. to 12ft., measured along the spine from the tip of the nose to the end of the tail; and females from 8ft. to 10ft., perhaps (very rarely) 11ft., the height in either case varying from 3ft. to 3½ft., possibly sometimes 4ft. at the shoulder. The average for the male, however, is given as 9ft., and for the female 8ft. The tallest and longest individuals are not necessarily the heaviest, and the tail is sometimes relatively long, so that a beast which measured a good length might be a poor specimen, while a short bulky animal would be really far larger. Colonel George Bolieau says of a male killed by himself: "I can speak positively as to the size of the tiger; his length was well over 12ft. before the skin was removed. He was, of course, quite an exceptional size, and unequalled, so far as my own experience goes, which extended over seventeen years of constant hunting after the species. My own experience of the size of tigers is, that in the female the size runs from 8ft. to 91ft,—the latter exceptionally large—in the male, from 9ft. to 11ft. A well grown adult tiger is seldom less than 10ft. in length." Colonel J. Macdonald found only three out of seventy tigers he killed touched 10ft., one of which was 10ft. 4in., the heaviest he ever saw weighing 448lb. Among 180 which Mr. F. B. Simson had seen measured, not one quite reached 11ft. By far the largest skins he had seen were from

China. Colonel Sir H. Green gives the length of a tiger which he killed as 11ft. 11in., measured in the flesh. Mr. Shillingford, who can reckon over 200 tigers to his "bag," met with one monster that measured as he fell 12ft. 4in., a very old, short-haired, and faintly-marked animal. This, it appears, is also sometimes equalled, as in the case of one that fell to Mr. White, the gentleman who measured it saying: "I can remember beyond all doubt the length was 12ft. 4in. from tip of nose to tip of tail, 2ft. 2in. from ear to ear, the direct breadth of wrist 8in., spread of foot 10in., heel to withers 4ft."

These particulars, given from memory, were disputed at the time of their publication by several competent judges, and must be taken with the utmost reserve, especially, I think, with respect to the breadth of the wrist. The following dimensions, given by Colonel Ramsay, of a specimen shot by himself, and estimated to be about 12 years old, are likely to be more trustworthy: Extreme length, 12ft.; tail, 3ft. 9in.; height from heel to shoulder, 3ft. 7in.; girth of body behind shoulder, 5ft. 3in.; girth of forearm, 2ft. $10\frac{1}{2}$ in.; neck, 3ft. 7in.; distance between ears, 1ft. $6\frac{1}{2}$ in.; length of upper canines, 3in.; lower, $1\frac{3}{4}$ in.; claws, 3in. Colonel D. G. Stewart killed a tiger, not at all approaching the above in length, the girth of whose forearm he asserts to have been of the almost incredible size of 4ft., the average being, he says, 32in. or 34in.

Whatever we may allow for error, these proportions proclaim a beast of enormous strength. Let us picture to ourselves an arm as large as the chest of an average man, consisting of two almost parallel bones covered with muscles. We may then realise in some sort the terrific character of the blow dealt by such a limb, armed, too, with four claws, each 3in. in length. It is, indeed, almost possible to believe the accounts of such an animal pulling an elephant to its knees, or smashing the skull of an ox with a single blow of this huge weapon.

The tiger, however, in spite of his great strength, does not always have the best of it, as appears from a communication to the *Field*: "The following extract is from a letter lately

received from my son, Mr. Fred. Palmer, a tea planter in After writing a short account of a day's Sylhet, Bengal. sport with snipe and jungle fowl, he adds: 'Now, I'll tell you a funny thing which happened about 150 yards from my bungalow. A very large tiger had a fight with a wild pig, and which do you think won. Why, the pig. The tiger was found dead, lying in the tea garden, with wounds all over him, ribs broken, and a severe gash across the shoulder. I have the skull in my bungalow.' I am sorry I have no particulars of the fight, but trust to obtain a more detailed account. It must have been a very exciting set-to, and the result—the victory of the wild boar-one that most 'pig-stickers,' I think, would It would be very interesting to collect instances of combats between tigers and other game animals, and the results. The only instance I am acquainted with of a tiger and wild boar fight, other than the above, is given by my friend, Mr. R. Sterndale, in one of his graphic and interesting sporting works. Mr. Sterndale, when out camping, came up to the battle-field of a tiger and boar. The former was killed, and his carcase was found still warm, and terribly cut about by the pig. I believe, if we could collect further reliable instances of such fights, we should find the fine old Bengal wild boar always victor, and retaining his proud place as the pluckiest animal on four feet, and, perhaps, the quickest striker. I think there is an account given by 'Old Shekarry' of a prolonged fight between a tiger and a wild buffalo, resulting in a drawn battle, not to be renewed, as both died in their last charge.—C. P."

Why lions and tigers cannot, or, at all events, do not climb, is not easily accounted for. Their great weight, it may be said, would preclude them from doing so (but, on the other hand, the jaguar, which is quite as heavy as many tigers, climbs with the utmost facility), and their strength is far greater in proportion to their weight than that of the smaller cats. Quite recently I saw a lioness in the Zoological Gardens spring from the ground and hang by her fore paws for several seconds to a transverse bough of the tree trunks erected in the open-air

playground, with her hinder toes at least three feet from the flooring. Possibly these two species have lost the climbing habit by feeding solely on terrestrial game; while the jaguar and leopard, which do not disdain such small fare as monkeys and sloths, have retained it. So far as their structure is concerned, lions and tigers ought to be as well able to climb as any of their smaller congeners; it is, at least, fortunate that they do not, for a tree is a secure refuge for a man on the lookout, or for an imperilled hunter in time of need.

So many graphic descriptions of tiger hunting have been published that little can be added to them. The following incident, however, narrated to me by an eve-witness, may be worth recording. While a party were beating up a tiger in rather thin jungle among broken ground, one of the sportsmen descended into a dry nullah, and was climbing the opposite bank, when instantly the beast appeared, and, springing over the man's head, smashed his skull with a blow of the paw in passing. It is just possible that old tiger killers may see events distorted by the mirage of imagination when they come to tell their stories over a glass of grog after a day spent in the pursuit of the gentle woodcock or snipe; for human nature is apt to err on the side of bigness when animals of a really dangerous nature are under discussion. Some of these, I confess, have been too big for me, and those it is needless to inflict upon the reader; but others may be accepted without any great tax upon our credulity.

A very curious incident happened to an officer of my acquaintance when pushing his way through a patch of dense jungle where it was not suspected that a tiger was hidden. Without the least warning of its approach, he saw a momentary flash of yellow and black, and knew nothing more until he recovered consciousness, and found himself lying bruised and in great pain and unable to get on his feet. Raising himself with difficulty on his elbow, and striving to comprehend the situation, he found no blood about him, and felt nothing in the nature of a wound beyond a severe bruise on his head. After some

considerable time he was able to stand, and on looking for his rifle saw it lying four or five yards from him. The tiger, it seemed, having been roused by the beaters, and, bounding off in his fright, dashed against the man with his whole force and stunned him. None of the beaters had seen anything of it, and his brother officers could hardly believe their comrade's story of this singular collision with a tiger, the effects of which he felt for several days.

According to accounts I have heard from those who ought to be able to judge, a tiger can make a spring of 30ft. from his crouching position. Few animals except the elephant would be able to resist some 400lb. weight hurled such a distance, and it is really wonderful that any man who has been in the clutches of one of these brutes should ever escape with his life. One of those who had got off with very slight injury, told me that a wounded tiger charged him, and was content with merely leaving the marks of his claws on his thigh: but he has a most vivid recollection of his sensations when those huge tenter hooks were driven into his flesh. The tiger, finding no resistance was offered, thought it was not worth while to stay to maul him, and went off without doing further damage. This act of forbearance was probably dictated by the approach of the beaters.

Though on the whole more courageous than the lion, the tiger is usually a skulking brute, especially in the presence of man. His attacks on the buffalo, however, in which the bulls at times severely wound him, must be placed to his credit, and three or four tigers have been known to drive the inhabitants out of a village by their frequent attacks on the cattle and the occasional seizure of a human being, until the Englishman's rifle has been called in to put an end to the terrorism. In the agricultural districts of Mysore the tigers have become so emboldened by the timidity of the people, that they have been known to chase men in the open. The native methods of destroying them can do little to keep down their numbers, traps of every kind being most uncertain with so wily and powerful a brute. Netting is practised with considerable success in some

parts of Mysore. The nets, 50ft. long by 15ft. deep, are made of in. rope with a 9in. mesh, supported vertically on light poles, which fall and entangle the animals running against the net during the progress of a drive, when the natives run in and spear the game. A number of nets thus placed in contact are made to enclose a considerable space where a tiger is known to be lying, meanwhile he is prevented from breaking by the beaters making a sufficient noise all round his lair to convince him that he is surrounded by enemies, but not enough to frighten him into bolting. The net is propped up on forked poles 10ft. high, the slack at the bottom being passed under heavy logs or stones, and pinned with sticks to the upright portion, forming a loose bag, securely pegged to the earth.

Picked men now enter the inclosure and cut a wide path through the cover in order that the tiger may be shot in crossing it, while men placed in trees signal his movements to the sportsmen. Whenever he appears at the net in hesitation as to what to do, he is assailed with shouts and driven back, or if he attempts to break through a volley of spears may cripple or kill him. Two or three days may elapse before the inclosure is considered secure, and the strong top and bottom ropes fastened to trees. Against such a barrier the tiger is practically powerless, for it gives no hold for an attempt to break through, it puzzles the beast mightily, and may at any moment entangle him fatally. Confined in a small space, without food, or water, unable to sneak off at night in the glare of the fires lighted at short intervals all round the net, and bewildered by the ceaseless din on every side, the imprisoned Therefore it is not so beast usually becomes quite cowed. dangerous a task as might be imagined for the beaters to go in and hunt him repeatedly across the clearing to give the sportsman a chance, unless he is badly wounded and believed to be dead, when he is likely to charge at any moment. Leopards frequently jump over the net, but this never occurs with the tiger, though it would seem easy for him to clear the small height of 10ft. Very lively scenes take place when the beaters

are bustling the imprisoned tiger about, and he endeavours to break through their ranks, or turns from the levelled spear points. At these times he will lie in a thick patch of jungle invisible to his enemies, uttering resounding growls, but still reluctant to begin hostilities, while all the available forces of the party is summoned to the spot to put an ignominious end to the "Royal" tiger, whose dead carcase becomes a butt for the scorn and rage of his destroyers.

The prodigious destruction of animal and human life in India is not a little owing to the reluctance on superstitious grounds of a large section of the natives to destroy these carnivorous pests, under the belief that the malevolent spirit of the animal will haunt and persecute them, the name of the tiger being mentioned often with bated breath; but there is no objection to a European performing the part of executioner. Certain portions of the body, such as the heart, liver, fat, and some of the flesh, are credited with supernatural powers, and carefully preserved, the vibrissæ being particularly in request for the purpose of surreptitiously mixing with the food of an obnoxious person, under the absurd impression that these hairs are slow but certain poison. The claws and fangs are also valued as trophies; and it is nearly impossible to prevent the natives from stealing them.

Much discussion has taken place on the question as to the exact manner in which the tiger kills its prey. Some assert that it is done by biting through the vertebræ of the neck, others that the head of the victim is violently wrenched backwards, and the neck broken. The alleged smashing of the skull of a buffalo or ox by a blow of the paw is perhaps apocryphal. The brain case of bovine animals is quite small in relation to the face, and well protected by strong bone, and not an easy thing to break into with a bullet driven by a heavy charge. They probably kill how they can, by tearing out the vital parts or lacerating the large blood vessels—for instance, the carotids in the neck—just in what ever way is most convenient at the moment. The operation is, of course, only seen when the victim is a living bait tied up to entice a tiger within gun shot.

Some years ago my friend, Mr. E. H. Pringle, of the engineering department, was waited on by a deputation of villagers. with a request to kill a man-eating tigress, which had carried off five grown persons and a child of about ten years old. He repaired to the village a few days afterwards, with his own syce, fully prepared for action, and learned that since their visit to him an old woman had disappeared, and was believed to have been taken by the tiger, as bloody and tattered portions of her clothing had been found in the jungle. He ordered the mechan, or platform, to be built in a tree, about thirty yards from an open glade, and just before dusk an old cow was securely tethered in the open space, and he mounted his perch to wait for the tiger. The spot, almost surrounded by thick cover, would give the tiger every opportunity of approaching without fear of detection, and much to the watcher's satisfaction the cow bellowed at frequent intervals, bemoaning her captivity to her companions at no great distance in the village. Twilight passed, and the moon rose, sending its beams across the glade, and full on the open space where the old cow stood unconsciously calling her enemy to supper. Hour after hour passed without result, but the watcher had determined to keep at his post until daylight, and lose no chance of bagging the man-eater.

Sitting motionless and attentive, with his large-bore double rifle nicely balanced on a fork of the tree, and levelled straight at the cow, the chances were against the escape of the tiger should it appear. But his syce, sitting behind him with the spare rifle, every now and then gave evidence by a snort of having passed into the land where tigers trouble only in dreams. More than once the fellow made so much noise, in spite of whispered threats of punishment on the morrow, that the tiger must have been alarmed had it passed near the tree. The night was getting old, and the moonlight passing away from the glade, when, suddenly, a tiger bounded noiselessly from cover, and crouched right in front of the cow.

Then followed a scene which must, of necessity, lose in the telling—told, as it is, too, at secondhand. The tiger, in no hurry

for supper, dashed at the affrighted cow, and stopped short, then gambolled round it like a kitten at play, jumping over its back. and enjoying the struggles of the poor beast to break from its tether. The cow repeatedly put down her head to charge so far as her tether would allow, but the tiger slipped out of the way like a snake. The object of all this maundering soon became apparent. Two large cubs sneaked out of the jungle to their mother to learn a lesson in the art and mystery of cow killing. For many minutes more the tigress continued enacting the comedy which was to end in a tragedy for the benefit of the little monsters, who, doubtless, but a few nights since had feasted on human flesh. During the whole time her active movements had rendered a successful shot impossible, otherwise my friend would have endeavoured to save the life of the cow: but this was impracticable if the tigress was to be bagged.

Satisfied, apparently, with her amusement and the instruction afforded to her young, the tigress suddenly crouched and sprang upon the shoulder of the cow, bringing her to the ground, and after a few minutes of desperate struggling the poor beast ceased to move. The tigress then quietly sat down contemplating her victim, with her back to the tree in which the watchers were posted. Here was the opportunity so long waited for, and in another instant a large spherical ball went crashing through her back. The tigress spun round like a teetotum, and fell a few yards from the cow, but almost immediately rose again and offered a broadside target, when another bullet stretched her out dead. The cubs had disappeared into the jungle at the first shot.

No sign of life appearing in the tigress, my friend descended from the tree and examined the scene of slaughter. The cow was frightfully mauled both by teeth and claws, the throat torn open, the windpipe penetrated, and the blood vessels of the neck bitten through. On moving the head in different directions it became evident that there was no dislocation of the vertebræ; all the work had been done by laceration of the throat and neck, from which the blood had flowed as freely as if a butcher had been at work. An examination of the tiger showed the penetration of one bullet near the spine, passing out through the ribs, while the other had entered the chest under the shoulder. Although not a large specimen, she was splendidly developed and evidently very powerful. One of the upper canines, which now forms the handle of a paper knife lying on my writing table, which I regard with no little satisfaction as a memento of the destruction of the murderous brute, measures only 2½ in. from the point, along the outer curve, to the termination of the enamel—that is to say, the portion clear of the socket—while the largest of the fore claws, measured in the same way, is 2½ in. The condition of the fangs indicates an animal in the prime of life, or even, possibly, not yet fully grown, and disposes of the general impression that only old individuals among the felidæ contract the abominable habit of preying upon human beings.

Man-eaters cannot be considered common, but if left long to their horrible taste they become so addicted to it that no other game seems to possess the same relish for them; and it has the advantage of being easily secured where the natives are timid, and practically incapable of resistance. The worst case I can find is that of the six man-eaters which infested the jungle and road between Ranebi and Hazareebagh, in the years 1875 and 1876, and established a reign of terror which brought about the desertion of several villages, and closed many of the roads. Within the first three months of 1876 it is alleged that they carried off ninety-seven people of all ages! One would suspect this to have been a family party of tigers, consisting, perhaps, of the parents and four young, which had been brought up to the vicious practice by their mother while suckling them, and teaching them to cater for themselves. The natives in vain endeavoured to destroy the pests by all sorts of devices, until Baboo Bampersad Narain Singh volunteered to come to their relief. After six months' work, in 1877, he managed to bag them all, killing two and catching the rest alive, for which service he was presented by the Bengal Government with its thanks, and in addition a first class double rifle and shot gun.

A plea has been advanced for the tiger, on the ground that he keeps in check the numerous herbivorous animals which, it is said, would otherwise render cultivation almost impossible by their numbers. This is evidently the argument of a tiger preserver. In the first place, the tiger will not trouble himself to catch wild game so long as he can fall upon tame cattle. In the second, herbivorous animals are comparatively easily destroyed in large numbers by driving, and without the smallest danger; while a tiger may evade the utmost efforts of a party of men for a month, and very probably injure or kill one of them before he is settled.

Moreover, the wild species of Bos are, to all intents and purposes, exempt from his attacks, with the exception of the rare instances when he can separate a calf from the herd. The enemies to cultivation, then, which he can control, are resolved into hogs and deer, animals easily destroyed by proper methods.

The superstitions of the natives greatly contribute to the increase of tigers in districts beyond the usual range of British sportsmen. Had a Teutonic peasantry inhabited India it may be safely affirmed that they would not have submitted to the dominion of the tiger, but would rather have gloried in contests with the savage brute, while their bards and minstrels would have sung the heroic deeds of the boldest hunstmen. Superstition of some kind prevails wherever the tiger has its habitat.

Sir Stamford Raffies describes this feeling in Sumatra: "One of the villagers in the neighbourhood of Bencoolen told me that his father and grandfather were carried off by tigers; and there is scarcely a family that has not lost some of its members by them. In many places the inhabitants appear to have resigned dominion to the tigers, and take few precautions against them, regarding them as sacred. The natives hold the migration of souls, and call the tiger their nene, or grandfather, upon the supposition that the souls of their ancestors are dwelling in the tigers! On the banks of one of the rivers above 100 persons were devoured in a single year. When the tigers enter a village the people prepare rice and fruits, and place

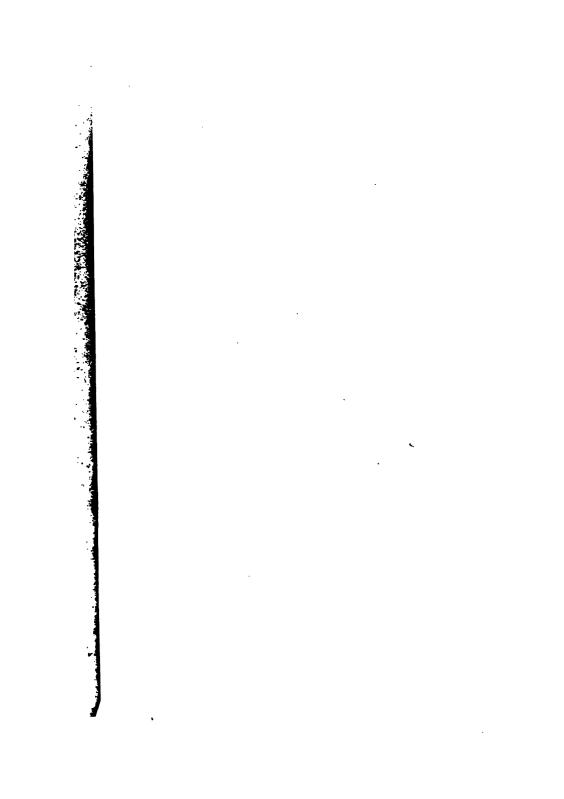
them at the entrance, supposing that the tigers will be pleased with this hospitable reception, and pass on without doing them any harm."

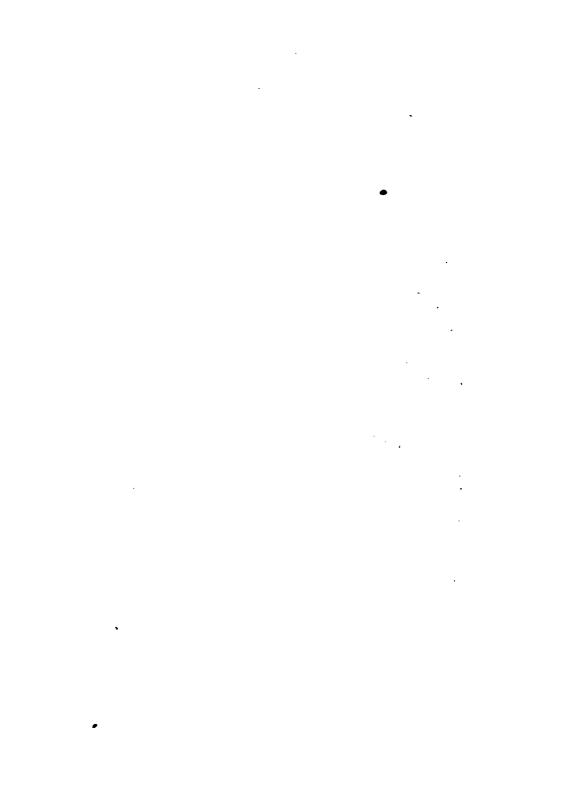
Many of the foregoing facts leave no doubt of the greater ferocity and courage of the tiger as compared with the lion. There can be equally little question of his greater strength, which has been shown by Houghton to be only 69.9 per cent. for the fore limb, and 65.9 per cent. for the hind limb in the lion, of the total in the corresponding limb in the tiger. The same authority states that five men can easily hold down a lion, whereas nine are required to control a tiger. To this may be added the testimony of Martial, from actual observation of the contests in the arenas, where the tigers always killed their antagonists, the lions.

One of the greatest living authorities on the subject, Sir Joseph Fayrer, who will have nothing to do with the tiger preserver's plea, has devoted much consideration to the best means of exterminating the carnivora as well as reptiles, and has urged the Government of India to take up the work systematically, in the firm conviction that the agricultural interests of the country imperatively demand relief from this heavy tax on human and animal life. Should there be any doubt about the necessity for this, we have only to turn to the official reports issued from time to time, which, however, fall far short of the actual figures, since it is impossible to induce the natives to supply full information. In 1881, the number of wild animals destroyed was 15,279, of which 10,483 were carnivora, 1557 being tigers. The loss of human life was 1459, of which the large number of 889 was due to tigers. The destruction of domestic animals by carnivora is probably not less than 40,000 annually. A reward of from 10 to 50 rupees, according to circumstances, for the head of a tiger, then, would be as good an investment as it would be possible to make in the interests of the agricultural classes, even were their property alone taken into consideration. Before many years have elapsed, in all probability there will be established throughout the whole country an organised system, under proper officers, to deal with reptiles and animals of a destructive character. However depressed the state of the Indian finances may be at any time, it would be the worst economy to withhold the small annual expenditure of about £12,000, which has thus far effected a marked diminution in loss of life and property, while it might with advantage be raised to double the amount.

Although the intelligence of the cat family is far inferior to that of many other mammals, surprising cunning is sometimes evinced by them. An interesting example of this is given by the author of "Sport and Work on the Nepaul Frontier," a writer who is evidently an attentive observer as well as a keen sportsman. Tigers, he affirms, will often crouch flat on the earth for the purpose of concealing themselves during a "beat," even when a line of elephants is trampling down the jungle close to them in every direction. He also mentions a much more remarkable instance of their sagacity. A tiger, being closely pursued, was suddenly lost sight of near a pool of water, and almost given up, when it was perceived totally immersed in the water with the exception of its nose, eyes, and ears, within a few vards of the sportsman, who forthwith gave it its quietus. The beast might have been thought to be dead had it not sprung from the water at the first shot, and only succumbed on receiving. a second through the spine.

Probably the most ferocious of the great cats is their largest representative on the American continent—the jaguar. One cannot but be impressed by its sullen and savage demeanour, even in captivity, while its prodigious muscular development is suggestive of the possession of even greater relative strength than the tiger. In South America its common prey, the capybara (or "carpincho," as the natives call it), that great amphibious rodent with the aspect of a Guinea pig, must tax the energies of its captor to the utmost; for, though unprovided with any offensive weapons, the capybara is exceedingly strong and bulky. Some specimens which I have shot were so heavy that two men could not carry them. Founding his opinion on common





report, and the fact that he had seen in Patagonia the skeletons of guanacos with, their necks dislocated, Darwin believed that the jaguar springs upon the shoulder of its prey, and by dragging back the head with one paw, breaks the neck, and he ascribes a similar habit to the puma. If this is the method of attack on the capybara, it implies very great strength indeed; the neck of that animal is very short and thick, and its general proportions similar to those of the hippopotamus.

Nothing on or above the earth comes amiss to the jaguar; he climbs with the agility of a cat, and it has been maintained that he lives to a large extent on fish when haunting the jungles of the large rivers. His unquestionable boldness has given rise to many travellers' tales, among them one to the effect that he lies in wait on an overhanging branch above a road or forest pathway, and pounces on the unfortunate passer-by. However this may be, jaguars have walked into towns and killed people, and surprised men left in charge of boats by swimming from shore and climbing on board. During floods in such large rivers as the Parana, the jaguars collect in numbers on the islands, or are brought down on rafts of drift timber, and stranded perhaps close to a settlement, Being driven desperate with hunger, they will then attack man or beast at every opportunity.

Inferior in every respect to the jaguar is its congener, the puma, which is seldom guilty of man-eating. It happened to myself, however, to encounter one of these animals in a jungle on the La Plata, in circumstances which might have ended in manslaughter at least. Although I had been duly warned of the presence of a "lion" in the reedy ground near the river, I could not resist the temptation of going out early in the morning to pick up a few snipe or teal in a favourite spot. The still, misty atmosphere recalled an autumn morning on the banks of the Thames, and nothing was further from my thoughts than the unpleasant reminder about to be made to me, that this was a small tributary of that mighty stream which drains the whole of South America from the fifteenth to the thirty-fifth parallel of latitude, and swarms with dangerous game.

Hearing a flight of ducks pass overhead, but invisible for the thick jungle, I listened for the splash as they settled on the water, and was then proceeding to stalk them, when a slight rustling of the reeds arrested my attention, and a puma sprang into a small clear spot, and crouched scarcely ten yards from me. For a moment the reflection that I carried only a No. 12 smooth bore, loaded with No. 6 shot, almost unnerved me; but I fired point blank into the beast's face as the only means of averting the impending spring, and threw myself on the ground, in the hope of avoiding the charge.

The shot had told with terrible effect; the puma reeled, fell, and struggled violently in the attempt to keep its legs, tearing the earth with its claws, and exhibiting the impotent rage of a powerful animal in its death agony. The struggle lasted for a minute or two, perhaps, while I could get no opportunity of firing the second barrel to advantage, and ended in the convulsive twitching of the limbs which betokens the certainty of approaching death. When all was still, I examined my unexpected prize, and found it to be a splendid female. The destruction wrought by that single charge of shot was astonishing. The face was completely shattered, several pellets having penetrated the brain, and destroyed both eyes. No doubt she had gone to the river to drink, and had not heard me until I was so close as to render a meeting inevitable, with the result of which I have every reason to be well satisfied.

The leopards or panthers of Asia and Africa, though far inferior in size to the tiger or jaguar, are nevertheless formidable even to human life on occasion, and add to their destructive powers by their ability to pursue their prey, such as monkeys—of which they are very fond—among the branches of trees. This habit, on the other hand, renders it easy to drive them to a tree with dogs, when they are killed without danger to the hunter. That they add considerably to the loss of life in India appears sufficiently clear from the official report for 1881, which gives the number of persons killed by leopards in that year as 239; while in some years they have destroyed more

than 16,000 head of cattle, thus, in this respect, exceeding the tiger.

The leopard seems to have a great partiality for the flesh of the dog, and, on the authority of Sir Emerson Tennant, it has a peculiar fancy for the flesh of persons suffering from small-pox. "They are strongly attracted by the peculiar odour which accompanies small-pox. The reluctance of the natives to submit themselves or their children to vaccination exposes the island (Ceylon) to frightful visitations of this disease, and in the villages in the interior it is usual on such occasions to erect huts in the jungle to serve as temporary hospitals. Towards these the leopards are certain to be allured, and the medical officers are obliged to resort to increased precautions in consequence." I have not been able to confirm this with the testimony of any other writer, but, when we recollect the fondness of cats for valerian, it is not incredible that leopards may find an attraction in the odour of small-pox as described, more particularly as the felidæ generally are said to prefer black men to white, on account of the usually stronger smell of their skins.

Some confirmation of this alleged preference is perhaps afforded by an incident which occurred at the Zoological Gardens in 1879. In that year several Zulus were being exhibited in London, and they were taken to the Gardens one Sunday in full war paint. On their appearance in the lions' house all the *felidæ* exhibited the utmost excitement, and dashed about their cages in such perturbation of mind, that the keeper was obliged to request the person in charge of the men to take them away. Possibly, however, this was only the effect of the unfamiliar dress and appearance.

With the exception of the short tail and the pencil of long hairs on the ears, there is nothing specially to distinguish the lynxes from the typical cats. They differ little in habit, whether the species be European, Asiatic, or American, and all of them betray in captivity the most savage disposition.

In the time of the Emperors, the European lynx, which is some 4ft. long in the body, was imported into Rome to

take part in the contests in the amphitheatres. It is still pretty common in the Pyrenees, and a few may possibly survive in the Alps, but, inasmuch as it is most destructive to sheep and goats, persistent war is waged against it. One species—the caracal of Africa and Asia—has been successfully trained to catch small animals as well as pea-fowl and other birds. The skin of the lynx is always soft and beautiful, especially in Northern Russia, where it is much more highly valued than the sable. The mode of attack is either to lie in wait patiently for long periods on the branch of a tree, or to creep stealthily towards its victim and make a sudden rush upon it, when, if disappointed, it does not attempt pursuit.

Anyone possessed of ordinary powers of observation, who saw a cheetah for the first time, would remark the striking points of difference between it and the true cats. The shorter body, longer legs and distinct muzzle, give it even almost a canine aspect, which is increased when the animal carries its tail much in the same manner as a dog. The gait, too, differs entirely from that of the cats, and the whole form suggests a capacity for great speed—as is actually the case—this being the only member of the group which captures its prey by racing it down. There are in addition to these features some peculiarities in the dentition; and the claws, which are only imperfectly retractile, cannot serve their possessor to anything like the same purpose. Its disposition in youth is altogether more dog-like, and it will follow its master, whether he be on foot or on horseback, with much appearance of attachment. None of the tropical cats would submit to the handling necessary for training the cheetah for hunting purposes. In these circumstances, it is not to be wondered at that some naturalists have insisted on placing the cheetah in a genus by itself, under the titles of Cynofelis, or Cynælurus. There are no important differences between the African and Asiatic species.

The sport of hunting antelopes by means of trained cheetahs, hooded, and carried on a cart with a platform, from which they are released on approaching game, has been often described. All

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writers are agreed on the immense speed exhibited by these animals when slipped at the game. The fleetest of antelopes rarely escapes the rush of a cheetah which has once well sighted his quarry, and it has been asserted that a greyhound cannot run into a doe, where a cheetah will almost certainly pull it down. In some instances the animal betrays its feline affinities by crouching and dodging, and taking advantage of cover, or waiting for the game to cross its track, and it usually seems reluctant to renew its efforts in case of failure. This has been attributed to the inability of the cheetah to "take another breath" after such great muscular exertion; but this is physiologically absurd, and the superstition is disposed of by the simple fact of a second rush being sometimes made immediately afterwards at another antelope in the herd.

Jerdon's description of the manners of his cheetah impresses one favourably with their docility. It played amiably with the dogs, followed him about on horseback, purred like a cat when fondled, and behaved admirably with human beings generally. When roused, however, the animal becomes as formidable an antagonist as any cat. A case is recorded of an African cheetah having been wounded, and dragging one man from his horse, mauling him frightfully, and killing another who came to the rescue of his comrade.

In many respect even more like a dog is the hyæna. Here the dentition is also peculiar, the claws are not at all retractile, the head possesses roughly similar outlines, and the voice is a short, rapidly repeated bark, simulating the derisive laugh of a human being. The habit of associating in packs is again distinctly characteristic of the genus canis, as well as that of digging up a dead carcase and feeding on carrion. No other existing carnivore is provided with so powerful a bone mill in the jaws, actuated by such immense muscles. It is an easy task to a hyæna to break the shafts of the largest bones of the horse to obtain his favourite bonne bouche, the marrow, and this characteristic may been seen in all his fossil representatives.

The capacity for digesting bone, too, is astonishing. The

keeper at the Zoological Gardens told me that he once threw six of the shank bones of the sheep to a hyæna, and the animal instead of crushing them, tossed up his head and swallowed them whole, one after the other. In view of such a performance it is little wonder the man remarked to me: "I can't think how he could turn round with all those things in his inside." However, the beast suffered no inconvenience from his gluttony.

All travellers agree in giving the hyæna the character of an ignoble, cowardly beast, though very destructive to flocks when a pack makes a raid at night. Livingstone quaintly says: "His courage resembles that of a turkey cock. He will bite if an animal is running away, but if the animal stands still so does he." When fighting with its own kind, the hyæna is said to have the peculiar habit of kneeling in front of his adversary, for the purpose, it is believed, of protecting his legs from the trenchant teeth, which he knows well would break them like straws.

CHAPTER II.

The Smaller Carnivora—The Civets and their Allies—The Skunk:

Effect of its Scent on Man and Animals—The Mungoos: its

Snake-killing Powers; Tournament with Cobras—The AardWolf—The Lesser Cats: Sight, Hearing, Smell, Colour;

Battles; the "Homing" Faculty; Perceptions and Intelligence—Bears: Hibernation; Sagacity of Polar Bears; Dr.

Rae's Account.

THE Viverridæ, or civet family, includes some interesting forms, among them the ichneumons of Africa and Asia, which go by the name of "Mungoos," "Mongoose," &c. They have the reputation of being able to destroy the most venomous serpents with impunity, on account of their knowledge of some herb which, being eaten immediately after the bite is inflicted, plays the part of an antidote to the poison. There is still something more than a lingering belief in this superstition, even among some who by education and opportunity should be better informed. The well-known perfume of commerce is supplied by the civets, whose anal glands secrete a fatty substance, which is collected periodically, and becomes an article of some value; it is now largely supplanted by artificially manufactured scents of more pleasing character.

It cannot be said that the civets present anything of great interest to the naturalist except in the points already mentioned. In the crab-eating mungoos of the Himalayas and Assam the anal glands are provided with muscles, which enable the animal to project its abominably disgusting secretion to a considerable distance, like the skunk. Of this latter animal I have had some most unpleasant experiences in South America. Long before I made the personal acquaintance of a skunk, I had heard many descriptions of the horrible effects of an encounter with the creature, and felt rather disposed to twit the narrators with the possession of a too squeamish stomach. It was not an easy matter for one whose organs of scent had never been assaulted by anything much worse than the odour of decomposed pig—which is assuredly bad of its kind—to credit the assertion that men had been made thoroughly ill, and deprived of all taste for food for days after receiving on their clothing the ejection from a skunk's anal gland. At all events, I did not in the least realise the possibility of this until I had had olfactory demonstration of the fearful smell the beast can make.

Coming home one day, jaded and hungry, just in time for dinner, I walked into the sitting-room of the "Estancia" house, and before I had time to recover from my surprise at seeing no preparations for the meal, I was literally almost knocked down by what I may, without serious exaggeration, term a blast of stink such as no adjective, even in the richly expletive Spanish language, could describe. Rushing out of the room, I met the Basque cook carrying a dish towards the wool-shed, who, seeing my disconcerted expression, broke out into a broad grin. "Where are you going?" I asked. "Dinner in the wool-shed to-day," he replied laconically, with the grin still on his face. At the door of the wool-shed I met Don T-, who with a bland smile inquired whether I would like my dinner served in the house with the skunk. He then explained that one of these brutes had either gone into or under the house, and behaved himself after the manner of his kind, and thus rendered it uninhabitable for some time at least. We had to live as best we could in the wool-shed, until the place had been "deodorised" by burning dry cow-dung on the mud floor, and shutting all the doors and windows. I never went into the house again for three days, and then the prepotency of the skunk asserted itself over the cowdung to such an extent that it was scarcely possible to remain in the sitting-room.

This introduction to Mephitis, with which I should have been well content, was soon to be followed by a more intimate Riding home one moonlight night, my horse acquaintance. hesitated at a bit of soft ground, and, knowing his habit—perhaps he had been badly bogged at one time—I struck the spurs hard into him, being well aware that the place was only fetlock deep. At that instant a dark object started from under his feet, and I was overwhelmed by that once "felt," never-to-beforgotten stench! The horse, no doubt, had perceived the brute. and would have avoided it, but my unfortunate irritation had driven him on, and we got the whole benefit of the skunk's discharge. What the horse thought of it I do not know, though he did not appear disconcerted. For myself, it was misery to ride another half hour with that reeking stench under my nostrils. On arriving home, I turned out the horse, shuffled off my trousers and boots (which certainly had received some of it), left them on the grass, and appeared to my astonished friends, who had just sat down to a game of "cut throat euchre," totally denuded of clothing as to my nether man. The laughter having subsided, the case was considered one worthy of some commiseration. No one else of the party had ever suffered equal misfortune, or, I may say, incurred the indignity inflicted on me. by that contemptible beast. I had to give one of the peons a dollar to burn the trousers next day—they were past saving and scrub the boots for a couple of hours with soap and soda. However, I could not make up my mind to wear them again, and it is doubtful whether anyone ever rode that horse again. Whenever a mount was wanted, and the peon asked which he should saddle up, the answer always contained the caution, "but mind, not that dark grey."

The secretion must apparently be protective, otherwise the animal would not, as I believe is invariably the case when surprised or alarmed, wait to make use of it before attempting to escape. Some dogs, I have been told, will run into a skunk and

worry him in spite of the warning discharge, but others are certainly strongly affected by it. Thus, my own retriever made a strong "point" one day in short grass, as I was strolling round on foot to look at the young lambs in a flock camped near the house. Having no gun, I called the dog off, and as he moved a skunk showed himself, and curving his back slightly, much in the manner of a cat, when in the retromingent attitude, shot a stream of fluid in the direction of the dog, very little of which touched him. It was with considerable surprise that I noticed how great a distance the creature was capable of squirting this -at least ten feet. Pulling out my revolver, I was about to draw a bead on the beast, when it made for me, and the next moment saw me in full flight before the possessor of such an abominably offensive weapon. Rallying, after a short run, a couple of shots from my revolver brought the enemy to bagwell, scarcely that, for I viewed the corpse at a respectful distance to windward, and admired the pretty skin, while fully appreciating the force of the adage, " Noli me tangere."

So powerfully had the scent affected the dog's olfactory nerves, and by sympathy, his salivary glands, that his mouth was covered with froth, although he had been but slightly touched by the discharge. To make sure, I gave him a thorough washing with soft soap, and afterwards a long swim in the river; but, even then, there was something more than a suspicion of the odour about him for some days. Violent and dangerous inflammation of the eyes, both in man and the dog, has been known to result from contact with the secretion of this animal. Some observers have asserted that, when about to discharge the fluid, the skunk faces the enemy, raises its tail, and lets the wind carry the discharge over its back. Were that the case, the protection must obviously be useless in calm weather, and in some other circumstances. I do not believe it physically possible, and I have always seen the skunk turn his tail to the enemy, and squirt out the secretion in a thin stream to an astonishing distance. Notwithstanding the evil smell of these animals, they are trapped in large numbers for the sake of their furs, the Hudson Bay Company alone having sent over 6000 skins into the market in a single year. Such is the force of association, that I can never see skunk's fur, as trimming on a lady's dress, without becoming immediately conscious of the odour, although, as a matter of fact, it has been totally eliminated from the prepared skin.

Perhaps the most interesting of the viverridæ is the "mungoos," or ichneumon, Herpestes griseus, on account of its reputed immunity from the poison of venomous serpents. It is still a part of the Anglo-Indian's creed in natural history, that this little animal is impervious to the bite of the most deadly snake. This is supposed by some to be due to the presence, in its blood, of some prophylactic; while others attribute it to the effect of a certain-or rather uncertain-plant which the animal is said to seek out and eat immediately after its encounter with the snake. Sir Emerson Tennent sums up the matter so ably, that I cannot do better than quote his words. After remarking that the natives of Ceylon attach no credit to the European superstition, he continues: "There is no doubt that in its conflicts with the Cobra de Capello and other poisonous snakes, which it attacks with as little hesitation as the harmless ones, it may be seen occasionally to retreat, and even to retire into the jungle, and, it is added, eat some vegetable; but a gentleman, who has been a frequent observer of its exploits, assures me that most usually the herb it resorted to was grass; and if this were not at hand, any other that grew near seemed equally acceptable. Hence has probably arisen the long list of plants—such as the Ophioxylon serpentinum and Ophiorhiza mungos, the Aristolochia indica, the Mimosa octandru, and others—each of which has been asserted to be the ichneumon's specific; whilst their multiplicity is demonstrative of the non-existence of any one in particular to which the animal resorts as a specific. Were there any truth in the tale as regards the mungoos, it would be difficult to understand why other creatures, such as the secretary bird and the falcon, which equally destroy serpents, should be left defenceless, and the ichneumon alone provided with a prophylactic. Besides, were the ichneumon inspired by that courage which would result from the consciousness of security, it would be so indifferent to the bite of the serpent, that we might conclude that both in its approaches and its assault it would be utterly careless as to the precise mode of its attack. Such, however, is far from being the case; and, next to its audacity, nothing is more surprising than the adroitness with which it escapes the spring of the snake, under a due sense of danger, and the cunning with which it makes its arrangements to leap upon the back, and fasten its teeth in the head of the cobra."—"Ceylon," fourth edition, 1860, p. 145 (Longman).

I have spoken with several who have witnessed these contests, and who can be trusted to report what they see, not what they imagine, and they unanimously support Tennent's view in every particular. At my request, an Indian friend sacrificed two of his cobras for the purpose of making a careful examination of the question. He wrote, "The tournament came off last week, and I wish you could have been here to see it. I prepared the lists by driving a dozen stakes firmly into the ground, and surrounding them with canvas, made snake-proof by letting the slack at the bottom into a trench a few inches deep, and filling in tightly with earth. A few nails driven into the posts at intervals made all secure, and we had an inclosure 12ft. across, about 5ft. high, and circular, so that neither of the champions could be 'cornered' by the other, while we could see everything comfortably over the top. I turned one of my cobras in, and the man with the mungoos arrived soon afterwards and dropped him into the inclosure. Both combatants were in good fettle, and they went at it in an instant, the snake for choice leading off. I never saw anything like the quickness of both—the repeated dashes of the cobra. and the still quicker springs of the mungoos. They were all over the inclosure in a moment, and I thought it was any odds that the animal must at last get that fatal blow driven home by the reptile. Still they kept at it, and we all thought the mungoos was mostly on the defensive. After a few minutes the cobra was clearly getting fatigued and seemed inclined to make off; but the least movement of his adversary brought him to the scratch again with hood erect, striking out with renewed energy. Yet there was no doubt the snake felt the effect of the long round, and was now, in its turn, on the defensive. For just an instant, he lowered his head, the mungoos dashed in, fastened on his neck, and never let go until he had chawed the spine to pieces. We could hear the crunching going on distinctly, and of course, the cobra went limp at once, and only rolled about helplessly. I do not believe the mungoos was once pricked even, much less did the cobra get a chance of closing his jaws on his enemy, without which a fatal bite could hardly be given.

"At all events, next day he was as fit as ever, and ready for another fight. Captain C- suggested that we should tie a handkerchief round him, to impede his movements; and this was managed with some difficulty. The second cobra, not so strong a snake as the first, was turned in with him, and the fight began, with all the chances in the snake's favour. For the first few moments, there was little to choose; but very soon the cobra got fast hold of his enemy for an instant, and immediately afterwards the mungoos began to look dull and flurried. In spite of being evidently wounded, he caught the cobra about the middle of the body and crippled it badly, and, after a turn or two more, finished it off. While my boy pinned the snake down with a stick, we let out the mungoos, on whom the poison was taking effect rapidly, to see what it would do. It did not make any effort to search for anything, according to the generally received belief, though there was plenty of herbage about the compound, but merely moped about, and died in perhaps a quarter of an hour. I cut the hair off with a pair of scissors. and found the wounds near the shoulder. One was rather torn, as if the fang had dragged on the skin. We were all convinced that the agility of the mungoos is his real safeguard. I think it would be safe to back him against the snake—at least the cobra -wherever he had room to make a fair fight of it; but it might

be different with daboia or bungarus. The viperines always impress me with a sense of their superior vigour and determination. The natives here are afraid to catch them for me, whereas I have no difficulty in getting any number of cobras I want. If I can get hold of a daboia, I will repeat the experiment with the mungoos, and let you know the result."

From these notes it appears conclusive that the animal is not endowed with any protective of a physiological character, and in these instances it did not seek for any antidote. Moreover, artificial inoculation of the mungoos with the virus of various species of snakes has always proved fatal with the symptoms exhibited by all other mammals.

A singular point in some of the members of this family is the structure of the tail. Thus, the *Paradoxures* receive their name from the peculiarity of a corkscrew-like twist, in that organ possessed by some of them to which no function has been attributed. The binturong, however, possesses a long tail, as prehensile as that of any monkey, which it employs in exactly the same manner.

That singularly aberrant form, the glutton, or wolverine, now confined to Arctic regions, although once spread over temperate Europe, has been credited with supernatural powers of digestion; but it is chiefly interesting for the sagacity it displays in robbing the traps of the hunters of their game, and eluding almost every conceivable device intended for its own destruction. If the accounts given may be taken as trustworthy, it displays as much reflection and ingenuity in springing traps and guns set for it, and then appropriating the bait, as we could expect from any human being fairly acquainted with such mechanical contrivances.

Another aberrant family is that of the *Protelidæ*, containing but one representative, viz., the curious South African "Aard-wolf" of the Dutch colonists, which possesses anatomical characters in common with the hyænas and civets. On looking at one of these animals, the long fore legs and striped skin give it a distinctly hyæna-like aspect, but the pointed muzzle and

large ears at once recall the civets, while in its skull and dentition it also resembles them closely. On account of its nocturnal habits and burrowing propensity, it presents little of interest to the student of animal life, the specimen in the Zoological Gardens, for example, being always buried in its straw, and apparently indifferent to whatever may be going on in the outside world.

I shall now make a few remarks upon the lesser cats before proceeding to the families of bears and dogs.

Those who insist on structural points as indicative of special provisions for the benefit of particular animals may be asked to reflect on the anatomy of the eye in the cat family generally. They are, it is admitted, mainly nocturnal, or, at all events, crepuscular in habit. Yet some possess a permanently expanded round pupil; others a cleft pupil, with highly contractile and extensile powers. Of the former group, the lion, tiger, &c., are examples; of the latter, the cats. The contractile pupil is held to be necessary, or, at least, advantageous to its possessor in excluding the superfluous light of day, in order that, when the light is feeble, the expansion of the organ may compensate, to some extent, the deficiency. Hence we are led to assume the retina to be peculiarly sensitive to light, and this contractile pupil to be the means of regulating the supply. Some writers affirm the lion to be entirely nocturnal when hunting. Be this as it may, both he and the tiger constantly seek for their prey at night; but neither of them is endowed with the form of pupil, accompanied by the sensitive retina, which is understood to be so advantageous to others of the family. Everyone knows that in daylight the vertical slit in a cat's eye is constantly expanding and contracting slightly, and in strong sunlight it is reduced to a mere thin line. But if you put a mousetrap down and let pussy look at the captive in it, you will see the pupils expand as fully as they do in the dark. It is the same under the excitement of fear or anger. My retriever, one day, happened to come suddenly on a cat dozing in a warm corner of a yard. According to his usual custom, he "stood" the cat at the distance of a

few yards, turning his eye up to me with an expression in it which plainly asked, "Shall I hustle her for a bit of fun?" Now, gentle reader, let me, by way of parenthesis, assure you, that I never allow my dogs to worry cats-not only because I have a due regard for the feelings of the cat and its owner, but also a supreme regard for the eyes of my dog. Pussy had assumed the form known as that of the "arch enemy," since there was no escape except by passing the dog, and, though the sun was shining full into her face, the pupils of her eyes were fully expanded and as round as globes. Thus, in certain states of mind, the eye of the cat can not only endure the full light of day, but seems to derive advantage from it. The popular superstition with respect to a cat's ability to "see in the dark" is, of course, The great capacity for expansion in the pupil enables the animal to take advantage of a small amount of light which would render no service to an ordinary eye.

After much search in London, a few years ago, for a quiet abode, I selected a house with "gardens" running at right angles to the street, at about fifty yards distance on either side. There was the great advantage of an outlook from the window of my workshop at the back of the house, on luxuriant foliage, patches of green turf, and flower beds. On one side rose a wall covered with ivy, wherein the sparrows in great. numbers carried on their nest-building operations in summer, and roosted during winter. Near by stood a withered acacia tree, in whose branches much courtship went on, and which served, as the days shortened, for clamorous congregations of the birds preparing to go to bed in the ivy. Well content was I with this bit of nature in a populous neighbourhood. In leisure moments it was pleasant to sit at the window, binocular in hand, and watch the mimic "struggle for existence" going on among the sparrows-the rivalry of the males, the squabbles for favourite nesting places in the ivy, the scuffles for scraps thrown out in the gardens, and the hair-breadth escapes from the snares of the juvenile fowler and the claws of the domestic cat.

Not many days had passed over my head in this "location"

before I became aware that I had taken up my abode near a paradise for cats. Day and night they patrolled the walls of the garden, making the air resound with those mysterious noises which no mortal has ever yet been able to interpret—which may represent either the height of feline felicity or the tortures of a feline Inferno. On human ears the effect is disastrous. Looking out of my window one morning, I beheld, sitting on a wall near the back door of a house, within a very short distance, seventeen cats of every variety of colour. By and by, as I gazed in much astonishment, an old woman came out with a tray of food and distributed it among the expectant multitude. The sleepless nights and unquiet days I passed need not be described. Remonstrance with any person who keeps seventeen cats, and is thus insensible to the comfort of her neighbours, is out of the question. I derived some compensation, however, from abundant opportunities for studying the habits of the cat, when following its own instincts, never before presented to me.

In the first place, then, the cat, when not dozing on the hearthrug, is, to all intents and purposes, a wild animal. Its ferocious character does not seem to have become much modified by contact with man, whom it regards as a relieving officer destined to supply it with food and shelter, and by whom it will, when in a good temper, allow itself to be fondled; going its own way, permitting no control, and expressing scarcely any gratitude for, or even sense of, benefits conferred. It rarely indicates that confidence in man so characteristic of the dog and the horse. We can do next to nothing for it in sickness or when injured, because it resents every attempt to relieve it, and rewards its would-be benefactor by sticking its tenter hooks into his flesh. It cannot learn consideration for animals equally enjoying the protection of its master. The rabbit-hutch or birdcage is certain sooner or later to be invaded by the cat, and the pet of the children to be ruthlessly murdered on the first favourable opportunity, though the intentions of the destroyer have been dissembled until a sense of complete security prevails. One morning, the children come down to feed their pet canary. Lo! the cage is empty. There is blood on the bars and a few feathers scattered about. In the silent hours of the night, the unfortunate bird has been dragged piecemeal through the bars of the cage by the cruel talons of that harmless looking Tom, who has comfortably slept off the effects of his meal, and now comes up purring and rubbing his head against the legs of the afflicted children, in brutal unconsciousness of having done anything amiss.

From the 'vantage ground of my window I witnessed many "a battle royal," and have always wondered how either of the combatants came out of the contest alive. These encounters are indeed terrible, carried on as they are with such formidable weapons, wielded with such immense strength. Much skill is displayed in the approach, and in fencing for an opening. The rigid body, raised high on the fore legs, moves forward slowly, almost with chameleon-like deliberation, the hind legs doubled under it, the ears laid back, the head partially turned aside, and the tail curved downwards. For many minutes in succession the strangest contortions of the body may be maintained without the motion of a muscle, the faces of the combatants almost touching, each watchful for the least advantage in the coming struggle, which seems never about to begin.

I have not been able to ascertain what actually determines the first blow, though the battle may be precipitated by throwing a glass of water over the animals. In an instant they are rolling over and over, locked in a fast embrace, gnawing each other's heads, while holding on with their fore paws, and trying to disembowel each other with their hind legs. The business is too serious for much noise. The continuous stifled growl and the flying fur betoken the severity of the struggle. It cannot last long, for the whole of the nervous and muscular force is being strained to its utmost. The separation is instantaneous, and for several minutes they will stand motionless and breathless, waiting for the renewal of the battle. I have seen two cats thus engaged for upwards of half an hour, with short intervals of rest. Perhaps each may secretly desire

to retreat with honour, but neither dares let the other know it. A few cautious sidelong movements, still on the defensive, indicate this. It is amusing to note sometimes how studiously they pretend not to observe these tactics of the opponent, and again how they will simulate the desire for retreat or feign inattention in order to draw the enemy into an unguarded attack. This is a common cause of another tussle.

On one occasion I saw a fine piece of strategy practised. One cat had evidently had the best of it, and stood over the vanguished. By and by, he turned slowly and marched leisurely towards a wall, looking round occasionally to see that he was not followed, and making for his own premises. did the other cat move until the retreating victor stooped to jump up the wall. Then, like an arrow released from a bow, he sprang after it, covering four or five yards in a couple of bounds, and struck his claws into his late opponent's head and his teeth into his neck. They both came to the ground, but the advantage thus gained turned the tables, and in a few moments the first victor lay maimed and gasping on the gravel walk. Then the conqueror sat down, viewing his work with satisfaction, and now and again licking his bloody paws. What the end of it may have been I do not know, for the barking of a dog startled the combatants, and they separated. I have seen hundreds of battles, but never saw one cat kill another right out. While sitting one summer evening in a friend's house, I heard a scuffle and jumped up to ascertain the cause. In the hall was a strange cat, just come in, no doubt, at the open door, in the clutches of the two house cats—a tom and a female. The affair could have lasted only a few seconds when the stranger ceased to make any show of resistance. In that short time they had killed it. The unfortunate intruder was torn all over and covered with blood. One eye was destroyed, the lower part of the abdomen was ripped open, and the bowels protruding. No dog could have done the work quicker. As I stood looking at the quivering body, the other cats walked about purring with their tails up in the manner significant of feline

satisfaction. On skinning the head I found sufficient evidence of the cause of death. In several places the fangs had gone through the skull into the brain, showing what terrible injuries these animals are capable of inflicting with their wide jaws, actuated by such powerful muscles.

So far as my observation goes, when cat meets cat upon a wall, unless one is much the stronger, there is seldom a fight. Probably they dare not risk a fall in which one would be certain to gain an advantage. But there they crouch, watching each other's movements, to the accompaniment of such music as we are wont to hear on moonlight nights. They will maintain this attitude for an almost incredible time—an hour frequently—and gradually edge off in opposite directions. This has impressed me with a favourable opinion of their powers of attention. During the whole time there is high muscular and nervous tension, and concentration of suspended energy on the object before them.

Only on one occasion have I seen a fight begun in circumstances of danger to the combatants from a fall. The struggle took place on the roof of a house, and almost immediately they began to roll down the slates, at the edge of which they would have been precipitated forty feet into the street. It was an anxious yet interesting moment for me; one of them was a next door neighbour—a notable black cat—his antagonist being a huge sandy fellow. The amalgamated ball of black and sandy fur rolled down the roof, apparently to certain destruction; but, on the very verge of the slates, it resolved itself into its constituent elements, and each cat clawed its way back to the ridge of the building.

The said black cat, my next door neighbour, was of very moderate size, but, without exception, the most redoubtable warrior I ever knew. Lying on a rustic table in his own garden, in a sunny and well-sheltered spot, he could command a view of the premises, without exposing himself to observation. As soon as an intruder dropped over his wall, and walked unsuspiciously down the gravel path, did my black friend pounce upon him

from the table; or, jumping on the wall, steal quietly along and drop suddenly on his victim from that advantageous height, always with disastrous consequences for the intruder. During a year or so, he waged continual war on all comers, with uniform success. Not content with defending his own castle, this Don Quixote went abroad, redressing wrongs in knightly fashion for all one can tell; but, certainly, when things were dull at home, he invaded the dominions of the old woman with the seventeen cats—of whom all that were males must surely have experienced his prowess. It needs scarcely be said that all this told upon the hero. White patches began to appear on that once velvet black coat; honourable scars, no doubt, betokening the severity of many a battle, and his ears were in ribbons. In the spring of the year, a hectic cough could be heard from the rustic table in the garden—the beginning of the end. Still, I saw no abatement of fighting power, though by this time he had become as thin as a hurdle. For a day or two, the garden table had no occupant. Then I called and inquired whether "the Don" was ill. He had come in after a prolonged fight with a large tabby, drunk some water, and died in the night, before the kitchen fire. The owner told me that this cat came to be fed pretty regularly, very seldom slept in the house, even in winter, attached himself to nobody, and accepted, as a matter of course, whatever was done for him.

I have dwelt somewhat at length, and perhaps tediously, on this phase of feline life, because it well illustrates the savage nature and the really untamed character of these animals, which, by a mere euphemism, we call "domesticated." Grievously offended, possibly, some readers may feel, and may be ready to overwhelm me with examples of docility and attachment among their favourites. Neither to myself are the virtues of the cat unknown or unappreciated. I do not forget that it has been an associate of man for more than 2000 years; that it has been venerated in an extraordinary degree by the people of one of the oldest known civilisations, who shaved their eyebrows and went into mourning at its death, embalmed its carcase with

all honour, decided important affairs on the auguries drawn from its unearthly yowlings, and even sacrificed human life in expiation of the sin of killing it.*

With all these advantages, it is surprising that it has advanced so little, that, with few individual exceptions, it remains in all its characteristics an unreclaimed savage. Quite unlike the dog, it is incapable of appreciating fun. We cannot play long, or in the least roughly, though unintentionally so, with a cat, but out come those tenter hooks, as if it were either unconscious of their power or indifferent to the pain they inflict. Whereas the dog will endure infinite annoyance and suffer positive torture, rather than close his teeth in anger on the hand he loves.

This ineradicable ferocity might be intelligible if we were continually renewing our domestic breeds with wild blood. But this is not so. In all probability—almost certainly—the cat sitting at our fireside is the direct descendant of hundreds of generations of ancestors, which have been in close companionship with man, and probably of the Egyptian domestic animal. It is, at all events, not any longer matter of dispute that the European wild cat has no claim to be the ancestor of our tame species. On the other hand, the great variety of colour and marking points to a mixed origin; and, as in the larger felida, we have striped, spotted, tawny, black, and even white examples. The pretty little rubiginous cat of India, whose body is about 13in. long, exhibits stripes which have become broken up into spots on the sides and flanks, and the aspect of the face recalls that of many of our cats. It may, indeed, not unlikely be one of their common progenitors.

The variations of colour under domestication might be expected to be as capricious as they actually are. There is, too, a sexual determination towards certain colours, though this is not absolute. Thus, a real tortoiseshell will almost always be a female, and a sandy or red tabby will pretty certainly prove to

^{*} The Egyptians.

be a male, while tortoiseshell and white may be of either sex. The blacks are cases of melanism, similar to those occurring among leopards; and there may be true albinos, but many white cats have normally coloured eyes. Very considerable variations in structure, which have arisen spontaneously under domestication, can be, and are, as is well known, perpetuated. This is observable in cattle, sheep, fowls, pigeons, rabbits, and notably dogs; neither has the cat escaped. The peculiar "tailless" variety of the Isle of Man is merely an abnormal form arising from an accidental variation, established by breeding within narrow limits.

The colour of the cat, when white, is often correlated with some structural peculiarities of the auditory apparatus, as described by Mr. Lawson Tait, in an interesting paper read before the Birmingham Philosophical Society, 11th October, 1883. He arrived at the following conclusions: "That no other animal but the cat is subject to congenital deafness; and only those that are entirely white are so affected. While some white cats with the ordinary yellow eyes are deaf, some blue-eyed white cats can hear perfectly well. On the other hand, a white female kitten, with yellow eyes, which appeared among those bred by himself, turned out to be absolutely deaf. Another, a male, that came into his possession, had supernumerary toes; one eye was blue, the other yellow, and the animal was totally deaf."

Mr. Tait described him as an interesting cat. His deafness was solely tympanic, for his intelligence could be reached by impressions conveyed by vibrations of solid media. Thus, a sharp stamp on the floor would attract his attention, even if he were seated on a chair or table. This cat was subject to epilepsy (in common with every kind of white animal Mr. Tait has kept as a pet), and the attacks came on during sleep, the first symptom being a disposition to seize his tail and bite off the end, whereby that member became considerably shortened. A carefully conducted autopsy revealed triangular perforations of the tympanic membranes—no doubt, congenital lesions—while all the cochlear structures were normal, as also were the

auditory nerves. The tympanum, iris, and skin, having all a common origin in the epiblast of the embryo, suffer in common an arrest of development; the pigment being absent from the skin and deficient in the iris, and the tympanum imperfect. According to Mr. Tait's experience, female cats are far more numerous than male, irrespective of colour; but, as he has known only one deaf female cat for some twenty males so affected, he concludes this form of arrested development to be more general with the male sex.

In the early summer, a large proportion of cats in populous towns undergo great suffering from the gross neglect of their owners, which everyone possessed of any feeling regards with the utmost indignation. We are assuredly bound by all considerations of humanity to undertake that those animals which have become dependent upon us by our own act, whether for our use or the gratification of our fancy, shall never be neglected. Many people, however, and particularly those whose means render totally inexcusable the selfishness which inflicts so much suffering, shut up their houses and go to the seaside or into the country, leaving the cat at home literally to starve. About the middle of June or July, any observant person may notice, by a survey of the adjoining back premises, these wretchedly gaunt creatures sitting on roofs and walls, or wandering carelessly about, howling piteously in despair at their desertion. I cannot understand how children and young girls, who have fondled and caressed these animals, can go right away and disport themselves on the yellow sands without a thought of the misery, the downright physical agony of starvation, inflicted on their former pets. Were anyone to set a terrier to worry the house cat, they would be the first to exclaim against the brutality of the act; vet in the whirl of excitement, in the anticipation of their own pleasures, they fail to reflect on the miserable death to which they are condemning a once favourite animal. Making all allowance for the truth of Hood's lines, that

Evil is wrought by want of thought As well as want of heart,

it is not easy to find excuse for the insensibility and thoughtlessness of the heart that cares for the pet canary by taking it with the family, and leaves the cat to its fate. A populous town is not a place in which a cat can hunt for its own living with any prospect of success, so that provision must be made for it.

How is this to be done? The habits and character of this half feral animal, it must be confessed, offer no small impediment. Cats, though seldom attaching themselves very strongly to individuals, have an extraordinary instinct of attachment to the locality where they have been brought up or have passed some years. While the dog is prepared to follow his master anywhere at a moment's notice, without a second thought of home as such, the cat will often escape from the person for whom it has exhibited most affection, to return, if possible, to its familiar haunts. On the very day for leaving town, pussy may be away on urgent private affairs, and, it seems, must perforce be left to take her chance. It is easier, for obvious reasons, to deal with an unsexed cat, for in these cases, so far as my experience goes, the instinct of attachment to locality is much weaker than in others. He will at once settle down with the family, even in the street next to that in which he had formerly lived, showing little disposition to return to his old quarters, though he must know the way to them well enough.

Common humanity dictates one of three methods of treatment. Either a dose of prussic acid should be given, or the cat should be left in charge of some responsible person to be fed, with free access to water, or it should be taken with the family. In the last case, unless it be confined for a long time at the new abode, it will surely wander and be lost, and is then likely to suffer as much as if left behind. On the whole, the prussic acid treatment would probably insure the most satisfactory result. It seems to be forgotten that the effect on the cat is much the same whether it be abandoned to its fate out of doors or shut up in a room in the house to starve. In the latter case, the law would interfere with prompt punishment by imprisonment of the offender, while in the former nothing is done and little said.

To my thinking, there is no difference in the moral responsibility. There may be some distinction, but to my eye it is microscopic. Were the two cases submitted to a higher judgment than that of any human law, would it fare better with the offender who turns the key in a door on a cat than with him who leaves it outside his house with an equal certainty that the unfortunate animal dies of starvation, or in its weakness falls a victim to the first boy who may throw a stone at it? Here is a clear field of action for the opponents of experiments on living animals for the purpose of physiological research. Without a doubt, more cats die annually of starvation in London than in all the physiological laboratories in the world, and they die a terrible death in consequence of the selfishness of those who are responsible for their well-being. Unfortunately, however, the case of these tortured cats does not present features which lend themselves to sensational or picturesque effects in advertisements and pictorial wall posters, and would not either arrest attention or draw subscriptions. The cat demands our thoughtful consideration the more by reason of its deficient moral and mental capabilities. Our ownership in it is precarious, and our control over it incomplete. It takes food from us with little or no expression of gratitude, and regards as its own the house in which we are graciously permitted to live with it. so deficient in perception as this surely might be allowed to enjoy its delusions, and be protected from the consequences of our fruitless attempts to raise it to the platform of civilisation, when it is liable at any moment to be turned out to starve in the howling wilderness which we have made for it with bricks and mortar.*

There are not any very adequate data for deciding on the powers of vision in the carnivora, but it may be taken for granted, perhaps, that that of the cats is not inferior to the same sense in other terrestrial mammalia. Of the delicacy

^{*} Since the above was written I am glad to find that a temporary home for neglected cats has been established in connection with the Dogs' Home, at Rattersea.

of their auditory sense there can be no doubt. Often have I seen the black warrior already described move stealthily off his rustic table in the garden on to the wall, when a cat was walking down the path of the next garden, in order to watch the movements of the enemy. About 3ft. of the height of the wall would intervene between him and the next garden when on his table, yet I cannot doubt that he heard the footfall of the other cat, a sound which probably no human ear would have detected. During the summer, it was frequently the habit of some of the seventeen pets of my neighbour (the old woman) to walk in at the back of my domicile and pass through to the front along the corridor and out into the road through the open doors, instead of climbing several garden walls. In doing so, they passed the door of the breakfast parlour, or whatever be the name of that front room of a house which lies below the level of the road, and is reached by the area steps. During warm weather, this room was pleasantly cool, and there I took A tom cat, who had been devoted to a life of celibacy by the veterinary surgeon, usually attended me at dinner, sitting respectfully, expectant of tit-bits, a yard or so behind the chair on which my retriever sat surveying with dignified self-restraint the plate whereon his master gathered fragments of vegetables and meat, to be presently mixed with the soaked biscuit for his dinner.

I have always avoided at meal-time the bad habit of reading. We should not divert to the brain by compulsory thought any of the blood which should be occupied about the digestive organs in stimulating their secretions. Nevertheless, I find a pleasure in the society of animals at this time, which occupies the mind in a gentle way and engages the sympathies. Failing such high company as the dog or a cat, I like to have a canary or other cage bird within sight; and in the Australian bush I taught a horse to eat "damper," in order that my frugal and solitary board might not be without the companionship of a fellow creature. An intimate friend of my own brings a favourite snake to dinner every day, and there can be no doubt of the

reality of the companionship he feels in this strange guest at the table.

. Now Tom kept a watchful eye and ear on his own domain, and fiercely resented any intrusion. No mercy was shown to cats of either sex taking the short cut through the house. While with me at dinner, he would now and again dash out through the open door, attracted by a sound inaudible to me, and a squabble in the passage immediately announced the punishment of a trespasser. This occurred too often to be attributable to accident. Inasmuch as there was no possibility of seeing anything moving outside from his position near me, his ear must have apprised him of the presence of the intruder on the bare boards of the passage. The sense of smell, on the contrary, is peculiarly feeble, at least in domesticated cats; neither is this surprising when their habits are considered, for in no ordinary circumstances can it assist them in securing their prey. This, I think, can be placed beyond doubt.

Cats have been credited with a knowledge of locality and direction, which, if a tenth of the stories respecting their "homing" faculty be true, must border on the supernatural. In the year 1873, Mr. Alfred R. Wallace proposed an explanation of their power of returning to their homes, after even months of absence, over totally unknown ground, attributed to many animals, and believed the faculty could be referred to the exercise of the senses; and especially that of smell in circumstances where the animal had been conveyed in a basket or closed vehicle, when it was impossible that sight could have played any part in affording data for retracing its way. In a letter to Nature of the 20th February, 1873, Mr. Wallace thus tersely summed up his opinion: "It seems to me that an animal so circumstanced will have its attention necessarily active, owing to its desire to get out of its confinement, and that by means of its most acute and only available sense, it will take note of the successive odours of the way, which will leave on its mind a series of images as distinct and prominent as those we should

receive by the sense of sight. The recurrence of these odours in their proper reverse order—every house, ditch, field, and village having its own well-marked individuality—would make it an easy matter for the animal in question to follow the identical route back, however many turnings and cross roads it may have followed. This explanation appears to me to cover almost all the well-authenticated cases of this kind."

. With all due deference to Mr. Wallace's reputation as a naturalist-without question one of the very highest in an age of splendid achievements in science—I think this explanation is fatally assailable at a number of points. But it is not now my purpose to enter into a general discussion which would occupy a very considerable space. There is, however, so distinct an issue raised by the words, "its most acute and only available sense," that this may be considered by itself with reference to the cat alone; and it appears to me to be fatal to Mr. Wallace's theory—at least in the case of that animal. Most people must have been struck with a suspicion of the deficiency of the sense of smell in cats, as I was myself long before I took any measures for ascertaining what its extent might be. Immediately on reading Mr. Wallace's letter, I thought it must have very doubtful application to cats, whatever might be the case with dogs. Accordingly, I made some experiments, which revealed to me a surprising and unsuspected deficiency in pussy's olfactory sense. These I transcribe from the copy of a letter which I wrote to the late Dr. Charles Darwin, who took a keen interest in the discussion then being carried on.

"I do not know whether you will consider this a crucial experiment as to the comparative acuteness of the sense of smell in dogs and cats, but perhaps it may be useful in adding one fact to the discussion on the part played by this sense in guiding animals home. I have long had reason to think that the sense of smell in cats is much less highly developed than in dogs and even many other animals, because, among other things, we see the difficulty cats often seem to experience in finding food thrown down to them, unless they see it fall, bobbing their

noses about on the floor in search of it, even when it is no distance from them. A few days ago, therefore, I prepared some dozen or so of dainty pieces of meat, both raw and cooked, and some pieces of fried cod and herring, and, taking my dog into a room from which every ray of light had been excluded, threw pieces of the meat into different parts of the room. As might have been expected, each piece was found by him almost as soon as the first could be eaten. The house cat was afterwards tried in the same room, and had great difficulty in finding pieces dropped close to her, failing altogether in securing some of them. What the dog accomplished in the space of a minute, the cat could not do in a quarter of an hour; for, on letting light into the room, I found pieces of the fish lying about in the further corners. There was no comparison between the one and the other in the manner of searching for the food. The dog went to work with confidence, and, after a few seconds employed in sniffing round, could be heard eating until every piece of meat had been found. The cat, on the contrary, walked about mewing, and seemed to have no idea of the presence of the fish until she was close to it. The cat was quite familiar with me, and had been kept a long time without food intentionally. I used fish because it was a food to which she was accustomed. and calculated to emit sufficient smell. The result impressed me with the conviction that cats discover food by smell with very indifferent success; whence perhaps it may be inferred that their perceptions generally through this sense are more feeble than those of some animals."

To this Dr. Darwin replied, in his wonted spirit of generous encouragement of investigation: "The experiments on the sense of smell in cats and dogs seem to me very good. From your previous note, I know you do not believe in the stories of cats returning home over unknown ground; but if such a case is mentioned in *Nature*, I would suggest your sending your experiment to that journal for publication, as bearing on Mr. Wallace's theory, which I am half inclined to admit." The last sentence will be of interest to students of natural history,

because, so far as I can ascertain, there is no published expression of the writer's disposition to accept Mr. Walface's explanation of the extraordinary homing faculty which has been credited to animals.

As a supplement to the above, I have since repeated the trial with two other cats, and varied it in this way. Several pieces of red herring and fried cod were placed under an inverted saucer, on the floor of a room where a hungry cat was shut up, and others concealed under the corners of the hearthrug. On liberating her in half-an-hour, not one piece had been touched. On letting the dog in, pieces of meat having been substituted for the fish, he first turned the saucer over, and afterwards scraped up the hearthrug and found the remaining pieces, without the least hint or direction from me. occasion, before I sat down to dinner, I put half-a-dozen scraps of meat on the floor, covered by pieces of paper about four inches square, forming nearly a circle. The tom cat came in as usual, sat down amidst the pieces, taking great care not to tread on any of them, and picked up and ate little pieces which I threw down, without suspecting the papers to conceal food.

If the cat's sense of smell is so deficient as this, one might naturally wonder how the animal becomes a thief, so expert, and so much dreaded by all housewives. In the first place, it is entirely devoid of conscience; in prowling about seeking what it may devour, neither the shelf, the larder, the dairy, the rabbit-hutch, nor the bird-cage, is sacred in its eyes, as they would be to the moral sense of any fairly well-fed dog. All in the stilly night the tempter enters into pussy and she steals off on her foraging expeditions, in all probability guided by daylight reminiscences of the place where food is deposited, or the pet canary hangs. In the morning, we find her dozing away the night's debauch on cold partridge or warm canary, with a placid countenance betokening a mind that knows neither retrospection nor remorse.

The (as I believe indubitable) obtuseness of the sense of smell in the domestic cat seems to place Mr. Wallace's theory out

of court, depending as it does on the exercise of this sense in a more than ordinarily acute form. But whereas of all our domesticated animals, the cat perhaps has been credited with the most extraordinary performances in the way of returning to a home from which it has been taken in a closed conveyance, it may be well to examine the case with regard to this animal. Some people are under the impression—it is rather a conviction with them which they never think of questioning—that neither time nor distance presents any obstacle to the cat when it has determined to revisit its old quarters. This has been made the subject of direct experiment—the only method by which unknown or uncertain elements can be eliminated from the problem.

The wife of a gentleman living at Hampstead gave me the following account of her husband's short way with cats. He possessed a very carefully kept garden, which, being the only considerable open space in the near neighbourhood, afforded a delectable playground and battlefield for the feline inhabitants of that charming suburb, to the detriment of the choice flowers he cultivated. Happening to be almost as averse to the destruction of animal life as a Hindoo, he caught them in wooden traps, and drove out with his captives towards Hendon and Finchley, where they were liberated, not more than two or three miles from home. This method of "transportation" was adopted throughout the summer, and at least a score of his enemies were thus afforded an opportunity of testifying to their reputation for finding their way home. Not one of these, so far as he could ascertain, ever revisited his garden, and though the ownership of many of them was well known to his gardener, it was not discovered that any of the lost ones regained their homes, where they must have been seen by the man. The best evidence of the success of the method of transportation was to be found in the complaints of the owners of the trespassers, who were not long in doubt as to the author of their losses.

Unless we suppose all these cats to have met with an untimely end while making their way home over so short a distance, easily traversed under the guidance of the unerring instinct claimed for animals, we must believe them to have wandered away and established themselves elsewhere, or to have fallen victims to the dangers which beset them during prolonged absence from home and deprivation of food and shelter. The term "stray cat," so often heard, points either to a suspicion that the animal in question may be actually lost, or that it is not endowed with any strong feeling of attachment for a familiar locality, in fact, that it is indifferent whether it returns to its former home or not, which, however, is contrary to all experience The following letter from a correspondent of the Field, of 8th June, 1878, throws light on the subject that is worth preserving:

"Like most dwellers in the suburbs of London, I have at various times in my life been terribly annoyed by cats, and, while quite willing, for the sake of neighbourly good feeling, to put up with a good deal in this way, my 'semi-detached' was in possession of a perfect demon of a cat—a cat that was not only mischievous in itself, but the cause of a nightly gathering of mischief in my back garden. Not only were my nights made hideous, but nothing that came within this cat's reach in the daytime was safe, and its doom was fixed by the following incident: One summer afternoon, the children's rabbits were playing on the grass plat, when this demon rushed in among the poor frightened things, took one of them by the ears, and started off home with it on its shoulders. Of course, a hue-andcry was raised, and poor Bunny's life spared; but I secretly determined to have that cat's blood, and acted accordingly. Perhaps about a week—certainly not more—had elapsed, when one of my children ran from the garden to say that Wcat had come back again. I must here say that Master Pussy was only supposed to have gone astray, and that no one suspected a brutal murder had been committed. On receiving this information, I gently strolled down the garden, and found poor pussy's place of sepulture undisturbed. I was now curious to get a sight of returned Tommy, and in a day or two my wish was gratified. I had the best of reasons for knowing that it was

not the same cat; but I was staggered at the resemblance, and no longer wondered at the welcome the supposed prodigal had received. It was an ordinary striped 'tabby' cat, and to this day my old neighbour is firm in the faith that it was the very animal he lost a week before! I have no hesitation in saying that this true story will account for scores of the marvellous tales we read about Master Tommy. They are simply cases of 'personation.' Attracted by the smell of 'cat,' the stray animal came upon my neighbour's premises, and, being welcomed by the children, and also finding a 'vacant chair,' adopted the new home like the good, sensible cat he turned out to be, and lived happily for ever afterwards. The lucky coincidence of colour set aside all other difficulties, if there were any; and the cat slayer held his peace. Since the case above narrated I have been troubled with many cats, but have grown wiser; and my mode of dealing with vicious cats now is to send them for a short excursion from 'home'-say two miles-and in no instance have they ever returned.—S. M."

"Personation," as here described, may very probably sometimes occur with cats, among whom, especially the striped tabbies, there is now and then a most minute resemblance of every detail of marking; but I do not think it possible with dogs, whose individuality may be distinguished in every movement and expression. While no one can prove a negative, many people can easily spread one of these stories, which is passed from mouth to mouth, gathering as it goes, until a small substratum of fact becomes a mountain of fiction. In this form, it is hopeless to attempt to demolish it. Whenever I hear one of these veritable histories narrated, I ask first "Was it your cat?" The answer nine times out of ten amounts to this, "No;. but A., on whose word I can confidently rely, told it me exactly as he heard it from his intimate friend B., a lady of considerable ability and very fond of animals, who knew the cat perfectly well from seeing it frequently at a house in the village, where she gathered all the particulars from the people who took the house after the owner of the cat moved. They were much

surprised to see the cat come in one day about a month afterwards and take up its quarters at once, and go mewing about as if it knew the place well, and, besides some of the neighbours recognised it at once as the little tabby that used to belong to the Smiths, who have gone to live at ———, ten miles off. And I can assure you," &c. This happens to be one of the samples in my note-book, and many a change could be rung on it.

It is usually most difficult to establish the first essential point, the identity of the cat; and if we can attain that with reasonable certainty, a host of other difficulties and doubts present themselves. One may at the outset dismiss, as not worth inquiry, any case where the narrator, whether at first or secondhand, becomes annoyed at cross-examination. a person cannot distinguish between your implied doubt of his knowledge and an attack on his veracity, that person's habits of mind are assuredly not calculated to inspire confidence in his capacity to make accurate observations on his own account, or faithfully to convey those of others on a point in natural history, surrounded by so many difficulties. On the other hand, a steady cross-examination, when submitted to by the examiner in a spirit of anxiety to arrive at the truth of the matter under inquiry, will place us in a position to determine whether it is possible to reach the facts and then found some conclusion on them. I must, however, remark that even this elementary form of the scientific spirit is not, in my experience, commonly met with; whence it becomes a tedious, and too often an abortive, effort to clear away the palpable rubbish and the manifold uncertainties which encumber stories so easily told or repeated by persons devoid of any critical capacity, and even unsuspicious of the treacherous character of their own memory. cross-examination these weaknesses come out, accompanied by irritable asseveration of the narrator's credibility. It is then best to pass to some irrelevant remark on the state of the weather, and leave that interesting story to be told to a more confiding auditor.

While I guard against committing myself to any assertion of

the invariable untrustworthiness of these accounts, I cannot but be impressed with the readiness with which they crumble to pieces on examination. No one, of course, will dispute that cats have, on what appears to be very strong evidence, made some remarkable journeys, and, so far as we know, without any assistance. Thus I should deem a journey of even five miles remarkable, though it is not at all beyond possibility that the cat had made excursions on its own affairs to that distance from home in more than one direction, and would be acquainted with the way there and back. Still, in a number of something more than seventy of these accounts, I find only one alleging the distance to be over two miles, which can be accepted as trustworthy, irrespective of any question of distance.

This was told me by an old sporting companion, who in all things within his own knowledge was an accurate observer and conscientious narrator; but this was unfortunately a secondhand narrative. An acquaintance of his, living near Sunderland, had a male cat, which had been condemned to death, after fruitless efforts to domesticate it, at a distance of five or six miles from home. It had returned more than once, if my memory serves me. Finally, one of the servants was charged with the task of disposing of it, and he carried it in a bag to Sunderland Bridge, whence he threw it from the bag into the water—a height of about a hundred feet—and walked leisurely home, in the conviction that the affair was at last settled. On arriving, he was much astonished to find Tom sitting before the fire, licking himself dry, apparently none the worse for his ducking. The neighbours hearing of this, of course regarded the cat as "charmed." The incident seems to me to prove simply that the animal had a fortunate escape, and went straight away home over ground which it had probably often explored; Sunderland was not the populous place forty years ago that it is now. After this fruitless attempt to destroy him, Tom received a ticket-of-leave for the rest of his life.

Whatever credence we may be disposed to give any particular story of this kind, there is no escape from the results of the method of direct experiment by "transportation," and unless in all these instances the cats are remarkably unfortunate, their failure to return is almost a conclusive answer to the wonderful stories we hear from time to time.

Passing from the supernatural to the natural—the closest observers are inclined to assign a low degree of intelligence to the cat. Perhaps few would rate its mental faculties as high as those of the horse, while I myself, without a moment's hesitation, consider it unworthy to be named in this respect with the pig. Usually poor piggy, although termed by courtesy a "domesticated" animal, has no opportunity of showing his quality; he is brought up solely with a view to prospective ham or bacon. Shudder not, gentle reader; keep a pet pig and judge for yourself. Let not the lip of pussy's master or mistress curl with scorn at the suggestion of any comparison between the occupant of the hearthrug and of the sty. The poor cat can only mew, and pur, and "spit." The pig "grunts."

True, that is the popular belief, and it is supposed to sum up all possible knowledge of his vocal organs. Now, in piggy's voice there is, to those who listen with knowledge, a gamut of the passions and affections scarcely less expressive than that of the dog, and to this corresponds a nature capable of attachment and docility beyond the belief of those who have never seen the animal except at the feeding trough, or in the more picturesque surroundings of autumn woodlands, gathering acorns and beechmast. It is of no consequence whether the story of the "learned pig" be true or not; it serves the purpose of pointing out how much we have lost by dooming this interesting animal to a life of gluttony and seclusion, and it is also unfortunate that he is physically unfit to take his place beside the cat and the dog as one of our domestic companions. Were this not so, his sobriety of manner, his amiable disposition, and, above all, his high intelligence, would be excellent recommendations for a place in the household.

Enthusiastic admirers of cats go to greater lengths, perhaps, than any other devotees to their pets in recording stories of "marvellous sagacity." Thus, a leading critical journal, not however, strong in its natural history, lately told its readers how a favourite cat, belonging to a literary lady, used to take particular interest in her work. One day he jumped on the table in front of her, and watched her keenly for some time with so preternaturally knowing a look in his eye, with his head slightly on one side, that she was fain to lay down her pen and look at him. To her intense surprise and delight, he deliberately walked to the inkstand, took the pen in his mouth, and, leaping on the floor, began tracing characters on the carpet, in imitation, we may suppose, of his mistress! On another occasion, the lady apostrophized the cat in this fashion: "Oh, Timothy, I have lost a button off my dress; I do so wish you could find it for me!" Thereupon the creature looked at her knowingly, trotted out of the room, and in a few moments returned with the missing button in his mouth. No sane person will, of course, believe this account to be anything more than a deliberate fabrication, or the outcome of a peculiar, but not uncommon, mental condition. While there are people who will gravely make statements of this sort, and others who will as confidingly believe them, we need feel no surprise at any extravagance of assertion or inference in cases of the exercise of the homing faculty, where an additional temptation to mental vagrancy is afforded by the supernatural element.

Well authenticated instances are on record of cats lifting the latch of a door, or depressing the lever with their paws, and admitting themselves to the house; and there are others, of doubtful credibility, related of their springing up and lifting a knocker to call attention to their desire to enter. I am glad to be able to bear testimony to one example of reflection on the part of a cat, which may not be much, but, in its way, indicates intelligence. I had established in this case great dread of a large straw hat by throwing it on to his back whenever he entered the room during my retriever's dinner time, and, by his presence, incited the dog to gobble his food. After two or three frights it was enough to place the hat on the floor,

when Tom would not cross the threshold. One day he jumped on the window-sill, within arm's length of my dinner-table, and mewed to be let in. I took up the hat by way of experiment, to ascertain whether he was conscious of the protection afforded by the glass, and struck at him with the dreaded object At the first blow he nearly fell off the window-sill with sudden fright, but recovering himself maintained his ground, while eyeing the hat suspiciously every time it touched the glass. There seems to be no doubt that the character of the glass had become established in his mind, and it at once occurred to him that its interposition was a sufficient protection.

This example appears quite insignificant beside one given by a correspondent of Nature, who described the action of a cat, which, if it were accurately observed, and recorded without the help of imagination, would constitute the most remarkable instance we can well conceive in the annals of animal psychology. It was the custom of the family to strew crumbs after breakfast before the dining room windows, for the benefit of the small birds, and it seems the house cat had once dashed out of a hiding place and caught one of them while feeding. Pussy, on a subsequent occasion, was seen to carry pieces of bread and strew them on the ground at a spot near a bush, where she concealed herself in the hope of inducing the birds to come within range of her spring, with what success was not related. In recording such a remarkable example of the exercise of reason, the "personal equation" of the narrator must be taken into account, and one would hesitate to put much faith in the observer unless the absence of all suspicion of an imaginative temperament could be clearly established. The cat may simply have carried the pieces of food out with a view to eating them, and not finding them to her taste, may have dropped them and retired to rest under the bush. had been afrequent habit, and if the lure had proved successful, we should be warranted in inferring intention, but it is scarcely justifiable to assume this from one occurrence, which leaves so wide an opening for accident.

Some observers have been more fortunate than myself in finding examples of a creditable moral character in cats. Thus, a correspondent of Nature, on the 19th of April, 1883, says: "I can add an instance of benevolence on the part of our household cat, who was observed to take out some fish bones from the house to the garden, and, being followed, was seen to have placed them in front of a miserably thin and evidently stranger cat, who was devouring them; not satisfied with that, our cat returned, procured a fresh supply, and repeated its charitable offer, which was apparently as gratefully accepted. This act of benevolence over, our cat returned to its customary dining place and ate the remainder of the bones, no doubt with additional zest." Dr. George J. Romanes, one of the most cautious and critical of naturalists, gives an essentially similar instance, as related to him by Dr. Allen Thomson, of a cat in his family, which attracted the cook's attention, and led her out of the house to a famishing stranger cat; and when the latter was supplied with food, paraded round and round the starveling, expressing satisfaction by loud purring.

The maternal instinct in cats is usually very strong, and occasionally expressed in a singular manner. In my volume of "Zoological Notes," page 73, I have described the adoption of a young Koala, or Australian "native bear," by a cat whose kittens had been drowned, with the exception of one. Although it did not live long on this unsuitable milk, the feline fostermother paid it most scrupulous attention, and indicated no suspicion that the little creature belonged to an alien race.

A most striking instance of this kind of adoption was given recently by a correspondent of *Nature*. A cat, having had three out of her five kittens taken from her, was found the next morning to have replaced them by three young rats, which she suckled together with her own progeny. A few days afterwards she was deprived of the remaining two kittens, and on the following day had installed in their place two more young rats, which she continued to rear with the others. This interesting spectacle of a cat suckling the young of its natural prey—

the foster-mother being, besides, a notoriously keen ratter—was witnessed by several persons whose credibility is beyond all question. It is not at all certain how far conscious "benevolence" prompted the cat, or to what extent she was impelled by the physiological necessity of relieving herself of her milk. Those who are charitably disposed will certainly give her the benefit of the doubt.

I have lately become acquainted with a tom cat whose gentleness goes some way towards redeeming the character of his species for savagery, and it would be unfair to omit mention of his exceptional temperament. He is the property—so far as a cat can be considered the property of any one-of a medical friend. By no means devoid of the power and will to use his claws and teeth upon a boisterous bull terrier, his behaviour towards a pet dove belonging to the children is certainly astonishing to all who have witnessed it. The bird, a common African dove, with the black ring round the neck, usually particularly timid, was introduced into the house when the cat was about two years old, and might be supposed to have its predatory instincts fully developed. In consequence of constant handling the dove became exceedingly tame, ranging the house at will, following the cook everywhere, and sleeping among the cinders under the grate, where its plumage became blackened until one could hardly tell what manner of bird it was. It now successfully disputes possession of the kitchen with the cat. Tom dares make no movement without the consent of the dove who will frequently drive him from the fire with furious assault and battery of its wings.

When in more gracious moods, however, the dove will allow the cat to eat off the same plate with it, and, in default of a more suitable object of amatory attentions, will march round and round the cat, pirouetting and cooing as though it thought its natural enemy capable of appreciating the proffered homage. These two may frequently be seen on the supper table, drinking milk together out of a saucer, in amicable companionship. Domestication brings about some singular modifications of instinct; but when one sees a dove now buffeting a cat and driving it from its food, and anon squatted down before the fire in close contact with the cat, and apparently enjoying the warmth of his fur, it is difficult to understand how this suppression of hereditary antagonism on both sides was brought about—for human agency had nothing to do with it. Night after night these two strange associates pass together shut up in the kitchen, and the cat, who has more than once brought in a large rat, has never exhibited any sign of a desire to molest the dove.

The behaviour of animals when suddenly brought into the presence of a picture, or their own reflection in a mirror, is always interesting, and would repay more attention than it has received. On entering a friend's house one day recently, I was struck by the natural appearance of a tabby cat, in the sitting position, painted on a fireplace ornament. On asking my friend whether his black tom had taken any notice of it, he replied, "Oh, yes, the first time he saw it, he stood perfectly still, then crouched and moved slowly to the side of the fireplace, keeping his eyes fixed on it, then retreated a little, and after gazing steadfastly some seconds, walked under the table and took no further notice of it then; though for a day or two he would just pause and look at it in passing, as if he had forgotten it until that moment." So far as was known tabby did not attempt to verify his conclusions by smelling or touching the picture.

That the cat has, however, sufficient intelligence to supplement the evidence of one sense by that of another, appears from a letter to Nature, 24th July, 1879, in which a correspondent says: "Many years ago, at Carne farmhouse, where relations of mine were then living, the household cat was observed to enter a bedroom in course of being spring cleaned. The looking-glass being on the floor, the cat on entering was confronted with its own reflection, and naturally concluded that he saw before him a real intruder on his domain. Hostile demonstrations were the result, followed by a rush to the mirror, and then, meeting an obstacle to his vengeance, a fruitless cut round to the rear. This manœuvre was more than once repeated with, of course.

equal lack of success. Finally, the cat was seen to deliberately walk up to the looking-glass, keeping its eyes on the image, and then, when near enough to the edge, to feel carefully with one paw behind for the supposed intruder, whilst with its head twisted round to the front it assured itself of the persistence of the reflection. The result of this experiment fully satisfied the cat that he had been the victim of delusion, and never would he condescend to notice mere reflections, though the trap was more than once laid for him."

From the anatomy of the bear family, which we may now consider, it might be inferred that this group had undergone considerable modifications in structure. The parts of the skeleton, though robust and immensely strong, preclude that activity combined with prodigious muscular power so marked in the cats. Owing to the position of the feet in walking, the whole of the sole being placed on the ground, they cannot run with anything like the speed of the digitigrade members of the order, and in other respects they are comparatively ill adapted to a predatory life. The teeth correspond to those of the dog, though the canines are relatively smaller. The molars, instead of having the blade-like tubercles on their crowns, are flattened into instruments for grinding their food, the lower jaw also permitting of some lateral motion which enables them to masticate vegetable food. Whether they are flesh or vegetable eaters the teeth are the same. Their diet, however, is much mixed, and may consist of roots, grass, ants, honey, fish, or animal food, so that it is difficult to make any strict distinction on this ground. Probably those which are normally herbivorous, become, in time of need, carnivorous, and vice versâ. Thus, Mr. Leigh Smith relates in his account of the "Eira" expedition, 1881-2, that "the stomachs of the Polar bears were several times found to be full of nothing but grass," at a time of year when animal food was certainly plentiful; yet this species, if any, would be entitled to be classed as strictly carnivorous. On the other hand, the common American black bear is said on good authority to be solely a vegetable feeder by habit

and preference, subsisting on berries and roots, and will pass animal food untouched when it can procure a sufficiency of these. It readily accommodates its appetite to a miscellaneous fare, including fish, insects, eggs, and small quadrupeds.

The family has a wide geographical range, from the Arctic circle to the tropics, and is well distributed over Europe, Asia, and America; but has no representative in the Australian and Polynesian group of islands, nor in the Eastern group of the Malayan region, and is confined to the northern portions of the African continent. In all the cooler regions the bear appears to hibernate, or at least indicates a tendency to do so; going into winter quarters when fat, and remaining ensconced in a hollow tree or cave, in a state of somnolent inactivity, when the respiration becomes slow, and the store of carbonaceous material laid up in the body is but gradually consumed. It is not, however, so apparent how the evaporation from the lungs is compensated for during a period of sleep extending over three or more months. Hibernation is mainly determined by scarcity of food in the winter months, especially in the case of herbivorous There is good ground for believing that even the American brown bear frequently prowls about during the whole winter, but possibly these are only the males. The old males of the grizzly bear may be commonly seen in winter, while the young and the gravid females hibernate. The same habit, according to some Arctic explorers, prevails with the young and males of the Polar bear; while the old females lie up in their winter shelter in a snow drift, and there produce their cubs. Mr. Leigh Smith's party confirmed this in the winter of 1881-82. They never shot a female bear from October to the middle of March, whereas the very large males were numerous throughout the whole winter.

The most formidable of the family is certainly the American grizzly bear, which has the reputation of attacking man "at sight." The beast is immensely strong, no doubt, and a man is crushed instantly in its huge arms; but we must accept with reserve the stories that credit it with killing and dragging a

buffalo—a weight of more than half a ton, probably—along the ground, though its own weight is said to reach 800lb.

The white, or rather cream-coloured, Polar bear, has no such reputation for ferocity, though, like all the family, it fights courageously when brought to bay, or in defence of its cubs. The Eskimo have no hesitation in pursuing these bears single handed in their sledges. When they come up with the quarry, the dogs are unharnessed and rush to the attack. Surrounded and worried by these, an opportunity presents itself to the hunter, who plunges his spear under the left shoulder of the beast as it turns to seize him. In spite of the skill and determination of these men, however, they sometimes fall into the clutches of a wounded bear and get severely mauled. Stories are told, too, of bears creeping silently over the ice on their hair-padded feet, and surprising an Eskimo as he sits watching a seal hole by giving him a tap on the shoulder to remind him that his hour is come. The hunter then, it is said, has only one chance—to roll over and feign death, and take an opportunity, while his enemy is unsuspectingly surveying him, of dealing him a fatal blow. In the days of my confiding youth I read in some book on natural history of an infallible method of escaping from a bear. The fugitive had only to lie down and pretend to be dead, when Bruin would come up and carefully smell the body to ascertain whether it was breathing. So long as one could hold one's breath there was no danger, and the bear, too magnanimous to slay the slain, would pass on his way peacefully. I have never met with any trustworthy confirmation of this, though the stories current among the Eskimo are very closely related to it. So deeply did the infallibility of everything I read impress me, that I used to train hard in the exercise of holding my breath, in preparation for the time when I should go bear hunting, and should have lain down quite confidently before the most savage grizzly. However, the opportunity has never occurred, and somehow my faith in the method has departed.

If the natives of North America are to be believed, we must

alter our notions of physiology very materially, for both they and the Eskimo entertain the opinion that the hibernating bears have no evacuations—stopping up all the natural outlets with grass, moss, or earth; and the Chinese assert that they lick their paws as a substitute for food, "and thence the goodness in the paws," which, however, is not a very obvious consequence.

The Eskimo account of the hibernation of the female Arctic bear is probably substantially correct. At the beginning of winter, the female, already with young, and in excellent condition, either scoops out a hole in the snow drift, or lies down and allows herself to become buried by falling snow. In course of time an accumulation many feet deep takes place, and the inmate of this natural hut is to a great extent protected from the intense cold. Her breath and the warmth of her body thaw a space around her, and a communication is also thus kept up with the external air by a small aperture overhead. In this singular lair the young are born, after an unknown period of gestation, and subsist on their mother entirely until they come forth in the spring as cubs of considerable growth. From three to four months has been given as the probable term of gestation. In answer to my inquiries, Dr. John Rae, F.R.S., whose journeys on foot and by sledge along the Arctic coasts and among the islands exceeded 6000 miles, and brought him more into contact with the Eskimo than any other traveller, informs me that he has been unable to ascertain the duration of the period.

There is something so remarkable in these circumstances of reproduction that we cannot but wonder how they were brought about. It would seem to be more advantageous to both mother and young that the family should come into the world when the spring is well advanced, and food both plentiful and accessible, than that they should subsist on her for possibly two months, and reduce her to a living skeleton at a time when she cannot procure food.

Geology may perhaps throw some light on the subject. The latest British Arctic Expedition brought home a valuable

collection of fossil plants. The evidence from these and others points conclusively to a mean temperature for Greenland of quite 30deg. Fahrenheit higher than at present in Meiocene, or at the earliest late Eocene times, when the lime, maple, plane, and even the evergreen magnolia flourished in those high latitudes. Trees and shrubs covered those far northern regions with abundant vegetation; the Grinnell Land bed of lignite indicates a peat moss, and in those now desolate and mostly glacier-covered wastes the delicate water-lily put forth its beautiful blossoms in spring. How different the picture of lands within the Arctic circle then and at present! The period of rich vegetation in those regions must have been co-existent with, and dependent on, very different seasonal conditions, arising from the varying eccentricity of the earth's orbit and the fluctuating position of its axis, as Dr. James Croll has so ably shown in his work, "Climate and Time." A luxuriant flora is not conceivably possible with months of unbroken darkness, and the alternations of the seasons must then have approximated to those prevailing now in the British Isles.

The Polar bear may be a survival from this Meoicene period of temperate climate, when hibernation, if it took place, was of short duration, including the term of gestation, but not extending to the birth of the young. The advent of a progressively colder winter temperature and decreasing supplies of food may then have forced the gravid, and in that condition less active, female bears to prolong the time of hibernation until the cubs, which in former times would have been born into a world waking with a genial spring, now enter upon their independent existence buried beneath a snow drift, and must there wait their release by the warmth of the sun.

The recorded examples of intelligence on the part of bears are not nearly so numerous as those of some other animals, but enough are extant to show that their mental powers are of a high character. I recollect when a boy seeing a bear go through a performance which implied probably as much intelligence as that possessed by the average dog at least. The

poor brute, muzzled and chained, had been walked ten miles, from London to a country village, on a hot day; and was made to perform a number of antics on the green before a public house for the amusement of the yokels, myself among the number. The discipline and docility exhibited by this animal, whether he had been indoctrinated by the red hot iron or a thick stick, indicated to my mind no mean powers of reflection. The keepers at the Zoological Gardens have taught their charges many show tricks. For instance, one of them will turn somersaults at command in different directions, and in feeding the Malayan sun bears the man says this is for so and so, and that for so and so, the individual named taking the piece of food assigned to him, while his companion quietly waits his turn.

In the Clifton Zoological Gardens, a Polar bear was observed by Mr. T. G. Grenfell to behave in a very intelligent manner. A cocoanut having been thrown into the tank, floated out of the bear's reach, when it immediately began to make a current in the water, which soon brought the prize within reach. She then tried to break the nut by leaning her whole weight on it with one paw. Not succeeding in this, she raised herself on her hind legs, clasping the nut in both paws, and threw it against the railings of the den, a distance of a few feet. Again leaning her weight on it to ascertain whether it was broken, and finding it was not, she threw it once more against the bars, and succeeded in her object.

It is scarcely possible to have a better instance of reflection. The bear, not being grown up when this habit was acquired, would probably have had a difficulty in getting so large an object as a cocoanut between her molar teeth, and would thus be led to try some other expedient. Whether the act of throwing originated in accident or design, it could only be continued with a full knowledge of the consequences. The tendency of Polar bears to throw, however, would seem to be natural to them in a wild state. Dr. John Rae remarks: "This circumstance was told me by an eyewitness, a very truthful and honest Eskimo of Repulse Bay. He said: 'I and two or three other

Innuit were attempting to approach some walrus in winter lying on the ice close to the water kept open by the strong current in Fox's Channel. As we were getting near we saw that a large white bear was before us. He had reached in the most stealthy manner a high ridge of ice immediately above where the walrus were lying. He then seized a mass of ice in his paws, reared himself on his hind legs, and threw the ice with great force on the head of a half-grown walrus, and then sprang down upon it." The instances of animals making use of missiles, though rare, assuredly raise them high in the scale of intelligence.

The following sustains Dr. Rae's high estimate of the intelligence of bears. Mr. J. M. Hayward, in a letter to Nature, says: "The following was narrated to me by Mohl's brother, on whose estate (in Russia) it took place. The carcase of a cow was laid out in the woods to attract the wolves, and a spring trap was set. Next morning, the forester found there the track of a bear instead of a wolf on the snow; the trap was thrown to some distance. Evidently the bear had put his paw in the trap and had managed to jerk it off. The next night the forester hid himself within shot of the carcase to watch for the bear. The bear came, but first pulled down a stack of firewood cut into seven-foot lengths, selected a piece to his mind, and, taking it up in his arms, walked on his hind legs to the carcase. He then beat about in the snow all round the carcase with the log of wood before he began his meal. The forester put a ball in his head, which I almost regret, as such a sensible brute deserved to live."

CHAPTER III.

The Dog the Friend and Companion of Man—Difference of Character and Disposition in the Wild and Domesticated State
—Origin of the Dog—the Effect of Selection—Sheep Dogs in the Australian Bush—Evidence of Early Domestication from Egyptian Monuments, Peruvian Graves, etc.—Some Effects of Domestication.

No one, we may suppose, will dispute that, of all the animals we have domesticated, the dog is entitled to fill the highest place in our esteem, and is alone worthy to take rank as the "Friend of Man." Of the numerous animals which have fallen permanently under our control, some have become necessary to us as beasts of burden, others supply us with food and clothing, and the sweet songsters of the grove delight us with their music and lovely plumage—albeit, they are, for the most part, unwilling ministers to our pleasure. But there is one only among the "lower animals" who has been raised to the dignity of the guardian of our homes and flocks, and has become the playfellow of our children, and our constant and faithful companion in everyday life. He is no respecter of persons, no seeker after ease and comfort. Whether his master be prince or pauper, we find in him the same devotion, the same cheerful obedience and constant readiness to sacrifice himself, while sharing the fortunes of the one human being to whom he may have attached himself.

Darwin very truly says: "It can scarcely be doubted that

the love of man has become instinctive in the dog." Uninterrupted association for many generations with human kind has impressed upon his nature a sentiment of trustful affection, that shows itself as soon as the puppy opens its eyes on a world in which the first creature it beholds except its mother is a man. The young of our domestic dogs wag their little tails and lick our hands as soon as they are able to roll about on their short legs. These comical little fellows betray not the slightest fear of us. They seem to have known us ages ago in some far-off land, or in a previous existence, and to have come back to welcome us as old acquaintances and friends. Here is the subtle effect of inheritance, that potent influence to which so large a part of the mental and moral character is due. The mother through a long line of ancestors unconsciously gives her progeny this birthright—the love of man, and confidence in his friendship. Among the awakening perceptions of the puppy there is nothing incongruous. All that he sees and hears ought to be there, just as it is, for him, the heir of civilization, the co-partner with man in a common heritage. He trembles not when the children seize him, and, struggling for possession, bear him aloft in their arms, while the mother looks on with equanimity, confident in the security of her young.

How different is the behaviour of the whelps of the wolf. Those I have taken from the nest when about three weeks old have snarled and snapped at my fingers with all their might, and striven their utmost to escape from my hands, in spite of every effort to soothe their angry feelings. To them I was a strange, wild, and fearful creature, to be treated as an enemy—the embodiment, perhaps, of all their inherited vague apprehensions of danger, for the first time presented to their perceptions in a concrete form. When those whelps grew to maturity they might remorselessly hunt me down and tear me to pieces without the slightest consciousness of that almost sacred tie which can subsist between their species and mine when domesticated.

Of this section of the carnivora—the Cynoidea—there appears to be no more than four genera, viz., the genus Canis, including a number of varieties of wolf, dog, and fox; Megalotis, or the long-eared fox; Lycaon, or the hyæna dog; and Nycterentes, or the raccoon dog. From this group appear to have sprung all the wonderful varieties of hybrids known, which are completely, or almost completely, fertile inter se and with both parents. If, as there is every reason to believe, all the existing varieties of dogs are the descendants of a few wild stocks, resembling one another in about the same degree as do the living species of wolf, we cannot account for the immense prevailing differences, except by invoking the influence of conscious and unconscious selection on the part of man.

There are two questions to be asked in examining the pedigree of our domestic dogs. Do any wild species still exist, or are any known to history bearing their characteristics? Does any fossil species throw any light on their origin? Taking a general view of the domestic varieties, we are impelled to ask whether the marked differences in them are original, or whether they are the result of long-continued selection. For instance, glance at the animals on the benches at any general dog show. Are the short-faced, under-hung bulldogs, the bandy-legged, long-eared dachshunds, the massive St. Bernards, the slim Italian greyhounds, and the wheezing pugs with their tongues lolling out of their mouths, the direct representatives of any wild dogs possessing these very distinct characters? To this we are able to reply pretty confidently, that these special physical features are not original. We know of no wild species with any resemblance to these particular forms, neither does history or tradition support the conclusion that such have ever existed in a state of nature. The answer, too, is confirmed by paleontology. The fossil members of the genus Canis present substantially unaltered the aspect of existing wolves and jackals in their straight legs, and long, sharp, muzzles, and this is the type associated with the earliest remains of man in pre-historic times.

We may, then, with considerable confidence, pronounce the extraordinary productions to be seen at a modern dog show to represent the divergences from a wolf-like animal which have been brought about by human interference, in some cases of not long duration. On placing a bulldog and a colley side by side we have an immediate measure of the degree of divergence to which selection has given rise. Among all our well established breeds, the colley perhaps approximates most closely to the ancestral wolf type, while the bulldog is furthest removed from it, in the shape of the skull and jaws. If two animals, differing so widely as these, had been found in a state of nature, no naturalist would have hesitated for a moment to class them as good and distinct species; yet this variation is due to causes which would not in all probability have been brought into operation, or with nothing like equal effect, by any natural circumstances. The modifications in most instances would be distinctly disadvantageous to a predatory animal. The shortening of the muzzle of the bulldog would impede him in cutting and tearing the muscles from the neck of an animal and bringing it to the ground, after the manner of the wolf, with its trenchant shear-like jaws; and those bandy legs would diminish his speed. In fact, several of our highly prized breeds if turned adrift to get their own living in a country well stocked with a variety of game would experience the utmost difficulty in supporting themselves; while some of them would starve in the midst of a rabbit warren from inability to catch anything.

This structural evidence goes a long way towards proving that domestic breeds had no direct progenitors with the peculiarities now so firmly established. When the ears of a dog are so enormously long and his legs so ridiculously short, as in the Basset hound, that he sometimes treads on his ears and turns a somersault during the chase, we cannot but regard that as a form which Nature would not have imposed on a hunting animal.

The very wide distribution of this group has been a fortu-

nate circumstance for man, enabling him almost everywhere to avail himself of its services; and its singular plasticity has afforded him opportunities for selecting the form most suitable to his wants. To the West Indian Islands, Polynesia, New Guinea, the Malayan Archipelago, and New Zealand it does not appear to be indigenous. Australia is doubtful, but I shall have occasion to refer to that presently. At all events, the races of man which now dominate the globe have always been in association with one member or other of the group capable of being raised to domestication. The young would frequently be met with, and curiosity in the first place might lead primitive man to take them home and rear them. He would have observed the wild species hunting down their quarry, and what more reasonable than that he should endeavour to obtain such fleet and strong animals to assist him in his own hunting expeditions? In the back bush of Australia I have often seen the whelps of the indgo running about the camps of the natives. is, or was before the advent of Europeans, the source of their hunting dogs. The young are taken from the nest (frequently in a hollow log) and brought up among the children. soon becoming attached even to these poor specimens of humanity. In this way, no doubt, the dog became the friend and companion of man in every part of the world. The Australian aborigines have not improved the character of their dogs; but we can easily imagine intelligent savages paying attention to the qualities exhibited by certain individuals strength, fleetness, and, above all, docility—and mating those which possessed them, or at least preserving the most promising young. Thus from the very first the principle of selection would be adopted to some extent, while the race of dogs would be gaining something by inheriting the effects of training and association with man.

This process has been going on for ages. Man has, in fact, been transforming the wolf into the dog by the exercise of that selective principle which he has applied to other domestic

animals and to innumerable plants. No more complete and valuable conquest over the brute creation has ever been effected. We cannot doubt that this one species has been the prime and indispensable agent in giving us dominion over those numerous animals without which it would not now be possible to maintain civilised existence. Townsend justly observes "the dog is the first element in human progress. Without the dog man would have been condemned to vegetate eternally in the swaddling clothes of savagery. It was the dog which effected the passage of human society from the savage to the patriarchal state, in making possible the guardianship of the flock. Without the dog there could be no flocks and herds; without the dog there is no assured livelihood, no leg of mutton, no roast beef, no wool, no blankets, no time to spare, and consequently, no astronomical observations, no science, no industry. It is to the dog that man owes his hours of leisure."

From the position of the hunting companion of man, the dog would be promoted to the even more important duty of guarding his flocks, Man, as we know, has in all countries passed successively through the hunting, the pastoral, and the agricultural stages. In the first of these the dog would be his chief assistant in the chase, and in the second most necessary in guarding the flock from predatory animals while out on the pastures, and giving warning of their approach at night by the habit of barking, which has certainly been acquired under domestication. No satisfactory explanation of the process by which the voice has thus become modified in so remarkable a manner has been proposed, but it is certain that no wild species gives utterance to any other sound but a prolonged howl, or very occasionally a short vapping noise. This change in the voice must have been useful, too, to pastoral man, for it indicates most clearly to the practised ear a difference in the character of the object at the moment exciting the dog's anger or suspicion, as I shall show presently from my own experience.

Even those who have witnessed the splendid work accomplished by colleys among the mountains of Scotland and Wales cannot fully realise the indispensable character of the services rendered by the dog to pastoral man in an unsettled country such as all Europe was at no very remote period when wolves abounded, and as Australia now is. In the back bush of that great southern island, towards the very centre of which the white man's flocks and herds are now spreading, one feels how difficult it would be to maintain one's position among hordes of savages and dingoes but for the watchful care of the dog.

To those who are acquainted only with the long established and generally fenced in "runs" of the Darling Downs—for instance, about Dalby and Warwick—it may seem that I exaggerate the importance of our canine friend as a guardian of sheep in some of the incidents I shall have to describe. But this importance could be brought home very forcibly to anyone who might be put in charge of a flock at a hut ten miles or so from the head station and any other dwelling, surrounded by dense forest, with patches of "scrub" interspersed, and the earth covered with grass as high as the back of a sheep.

It fell to my lot to be told off to take a flock at a hut so situated in circumstances scarcely calculated to render the prospect inviting. The former shepherd at that hut had been murdered by the blacks not long before, and a large number of his sheep driven off by them or dispersed in the bush, where the dingoes, having had a fine time among such easy victims, were more than ever disposed to consider sheep their lawful prey. Once a week the ration carrier would come round with my supply of 12lb. of salt beef, 8lb. of flour, 1/4lb. of tea, and 2lb. of sugar; but, owing to the fact that he always came while I was away with the sheep, I did not enjoy the good fortune of seeing a white face for a month. It is the shepherd's duty, after a hasty meal, to let his flocks out of the pens as early as possible in the morning. and follow them into the bush, guiding them by means of his dogs in the direction he wishes them to take, so as to avoid feeding over the same ground on two consecutive days. This is by no means the easy task those may imagine who "sit

at home at ease," and read flowery descriptions of Arcadian life in the boundless forests of the Australian bush, and so forth. A flock of more than a thousand strong wethers will walk twelve miles out and back in the course of a day, and spread over an area of half a square mile in no time, if not judiciously kept together, without, however, that constant "dogging," which worries them out of condition, and affects the quality of the fleeces, for these sheep are not the tame, tractable creatures to be met with on our open meadows. The sudden appearance of a native or a dingo may create a panic and a stampede, and then they will be out of sight in half a minute, and gallop wildly for a mile if not rounded up by the dogs. The heavily timbered country and long coarse grass give shelter to the enemy, whether humane or canine, and as the sweet grass on which alone the sheep feed grows in isolated tufts, they are always on the run to pick up enough to fill themselves.

Constant attention, then, is necessary. Where the ground is broken or covered with "grass trees" the shepherd may be unable to see more than a score of his whole flock at any moment. At such times a good dog will jog off, even unasked walk round the flock, and come back after his inspection with a satisfied air, expressive of consciousness of having done his duty, and shown that incompetent person, his master, how to look after sheep. Towards midday, as the heat becomes intense, they lie down or "camp," to doze away an hour and chew the cud. That is the grand opportunity for the enemy. Stealing up to the flock, a dingo or a black fellow may rush in among them, separate a score or so from the rest, and throw the whole flock into a state of wild confusion. Should this happen it is almost impossible for the shepherd unassisted to bring them together. It is the dog's business, however, while they are camping, to take an occasional look round and report to the shepherd. In the event of his perceiving anything to excite his suspicions, he barks, and attracts the man to the spot. There is always more than an "off

chance" of being made the target of a black's spear from behind a tree, and the keenest eye will in vain endeavour to catch sight of the native as he glides from tree to tree or crawls through the grass. But the preternatural sharpness of the dog's senses of hearing and smell will often supply the warning which puts the shepherd on his guard, gives him time to level his gun in the direction of the approaching danger, and show the enemy that retreat is the safest course for the present. When travelling with sheep, and camping them out in the bush on dark nights, the dingoes prowling round would certainly succeed in their frequent attempts to rush the flock, were it not for the vigilant ear of the shepherd's dog, quick to detect those stealthy movements and make a dash at the marauder, who never waits to try conclusions with his civilised relation, unless he gets fairly "bailed up" by a couple of sheepdogs.

For the first week after my arrival at the hut, where the poor old man had paid the penalty of his incautiousness with his life, I exercised the most minute precautions against surprise; sleeping hardly an hour at a time, sending the dog round the sheep yard half a dozen times during the night, and never letting the gun out of my hand. Many were the indications that I was watched unceasingly, both at night and when out with the sheep, for that opportunity which the patient savage always seeks of striking a certain blow without risking a charge of swan shot from that terrible weapon carried on the white man's arm.

It is in circumstances such as these that one learns how valuable are the much more acute perceptions of the dog in drawing attention to indications of the presence of the human enemy which he can distinguish from the scent or sound of animals. It is interesting to mark his anxious demeanour throughout the day, and observe his abiding consciousness of responsibility until the sheep are safely housed in the pens just before sundown, and his master sets to work to boil the "billy" of tea, and prepare

the evening meal. Then, for a little while, he is off duty. With what interest he contemplates the roasting over a bright fire outside the hut of that wallaby which his master shot in the afternoon as they were coming home. How solemnly he watches the mysterious movements of that incomprehensible creature, Man, busy with pots and kettles over the fire, for no purpose apparent to his simple mind, which, nevertheless, is strong in faith that out of all this will come a savoury stew such as his soul loveth. At these times we feel the reality of the companionship of the dog. The frugal meal, shared with him equitably to the very last tit-bit, becomes a banquet; and we only regret that he cannot partake with us in the enjoyment of that crowning luxury—the after-dinner pipe of Cavendish.

Some of those who read these chapters may have decided to try sheep farming in Australia. If they do, I would advise them to secure a good puppy on arrival at the station where they intend taking up their quarters, and make him their constant companion and friend. The breed does not much matter, so long as it is not kangaroo hound: but of course something with colley or retriever in it-my best dog, and the cleverest I ever had at the work, was a black retriever-should be preferred. He must be strong and courageous, for if he collars a dingo in the course of his business he must be able to master him, the bite of these brutes being most severe. The weight, then, should not be less than 65lb. Many squatters will not allow the use of dogs with sheep, because there is too great a tendency on the part of lazy and incompetent shepherds to be always "dogging" the flock, and keeping them in a state of nervous excitement, most prejudicial to their health, and obviously dangerous to gravid ewes. I have met with shepherds, too, who affect to despise the services of a dog; but these have rarely been men I would employ from choice. People who are deficient in the intelligence necessary to train a sheepdog, and use him with judgment, are not

likely to exhibit much capacity for any kind of work. The Chinese shepherds do without dogs; at least, I never saw one in their possession. This may be owing to their ignorance of the uses of an animal which "John," when at home, regards only with a view to soup and cutlets. The best of the Celestials, however, take infinite pains with a flock, and, as they work for much lower wages than Europeans, they are particularly anxious to avoid being mulcted in the sum of £1 for every fleece that cannot be shown to the superintendent when he counts their sheep.

In the heavily-timbered districts of the back bush, where natives and dingoes are numerous, even a moderately good dog is of the utmost service. Had the shepherd, whose place I took, been accompanied by the commonest cur, no doubt he would have been warned of the approach of the savage who speared him at the door of his own hut. Mine would have been a like fate, I can pretty confidently assert, in the absence of a companion whose organisation seems to be such that he never sleeps deeply enough to suspend the sense of hearing, or even of smell.

The shepherd's hut is placed about fifty yards from the sheepfold, or near enough for him to hear any disturbance among them at night. The inclosure is made of strong stakes driven into the earth at intervals of 12ft., braced together with stout poles, and made dingo-proof by numerous smaller stakes, with boughs interlaced, and banked up with earth. This is solid enough to resist the rush and crowding of the sheep should they be alarmed at night by a prowling dingo or native, for, in the event of their breaking out, nothing would prevent them from dispersing themselves in the bush. For some reason the dingo is reluctant to jump into the inclosure, though three or four of them will nose round it for the hour together, endeavouring to find an opening. Notwithstanding the temptation of the reeking smell of mutton within, they, perhaps, fear to jump into a place from which they may not be able to

escape. The value of a dog in giving warning of the enemy on dark and wirdy nights cannot be over estimated. out of number when I have been asleep the dog has roused me, and even then I have not been able to hear any movement among the sheep until I have got outside the hut, when his eagerness to dash off in pursuit of the enemy has proclaimed the unerring acuteness of his ear. The extreme nervousness of sheep in the Australian bush at night gives the native or the dingo the opportunity for attack, against which the shepherd must always be on his guard. On the approach of the enemy, they rush wildy in a dense body to the opposite side of the inclosure, running over each other's backs, and crowding against the fence with great force. The next moment they are off to the opposite side, and so on, until some weak place is sure to yield to the repeated pressure. If this goes on for any considerable time, and the shepherd fails to hear it, he will wake up in the morning to find the fold empty, and must then trudge off to the head station to get help to collect the remnants of the scattered flock. He will not be likely to meet with a cordial reception from the superintendent; and when, after three or four days, or a week even, the wreck of the flock is collected and counted. he may find that he has no wages to take for a year's work, and is in debt to the squatter for a good round sum besides. Then he will wish that he had made a friend and companion of some sharp-eared dog to rouse him from that slumber which has proved so disastrous.

In many other ways a dog may be most useful to a shepherd in a new country; for instance, in finding lambs which have been deserted by their mothers. How it may be in England I do not know from actual experience, but, so far as I can ascertain, the ewes here do not evince the singular indifference to the fate of their young which is one cause of serious loss to the sheep farmer in Australia and South America. In some cases, especially with highly-bred stock, nothing that the shepherd can do will persuade a ewe to take to her lamb and suckle it.

although she may have abundance of milk. I have had half a dozen of these ewes at a time in my hut, trying every plan to induce them to feed their lambs, which seem to have no notion of the source of the supply, unless they are directed to it by the mother or the shepherd. Lying on my bunk and watching by the light of the fire the behaviour of the ewes towards the lambs, I have speculated in vain on the cause of their indifference.

How is it that the maternal instinct is so feeble as not to respond to the wail of the young? What is the influence of domestication on animals—this indifference must surely be unknown among wild animals—that these Belgravian mothers refuse to nurse their children? To the best of my recollection it is always, or generally, the first lamb that is so treated. Possibly the mother, regarding its young as the cause of the distress and pain she has lately suffered, determines to have nothing more to do with it. This is all the more probable, as much repugnance to her child for some little time after its birth is often evinced by the human mother. By much persuasion and patient manipulation the estrangement may occasionally be overcome; but one sometimes witnesses the astonishing spectacle of a ewe walking away from her new-born lamb and never taking the least notice of it afterwards. Even when indifference is not carried to this extreme, there is much "culpable negligence" on the part of the ewes, by which their lambs are lost in the bush; and here an observant dog is really valuable. When, towards nightfall, the shepherd is moving his flock slowly homewards, numbers of lambs will be lying asleep hidden by tufts of grass or bushes, and many of their mothers will walk off without them as though they had no sense of responsibility whatever. On the lawn-like plains of the La Plata, even, where the grass is too short to hide a rat, a score of sleeping and deserted lambs may be picked up in the rear of a flock. There has been no hurry: no driving. The movement towards home has been determined by the spontaneous impulse of the flock rather than by any expression of the shepherd's will; yet there are mothers who go on cropping the grass as they wander quietly home, expressing

no concern for the young to which they gave birth but a few days before. Predatory birds and animals hanging about the feeding ground make short work of these derelicts unless they are recovered before night. My retriever took upon himself the duty of looking after these lambs, and he performed it in a highly benevolent and conscientious manner. He would quarter the ground systematically, and on finding a lamb give it a shove with his nose, driving it towards the flock. If, as was more likely than not, the stupid thing persisted in going off in the wrong direction, he would call my attention to the difficulty by barking, or occasionally endeavour to pick it up and carry it. Thus he saved, both in Australia and South America, enough lambs to make a pretty fair flock. Whether lambs thus neglected by their mothers are worth the trouble they give may be doubted, for they only maintain a precarious subsistence by snatching a little milk here and there from any ewes good-natured enough to allow them to draw on their supply for a few moments, and become weakly from semi-starvation and being compelled to eat grass before they are old enough to digest it.

When the shepherd has brought his flock home to the fold, his work is by no means over. On the contrary, the most tiresome business of the day begins there. The ewes walk in at the gate without ado, but their lambs consider this the time for high jinks. They will race round and round the fold, taking excursions now and then in a long stream to some distance, and coming back to pass the gate again and again, as if no opening existed. This wearisome game is often kept up for an hour, to no little annoyance of the shepherd, who wants to get to his supper. Time after time, when he has laboriously collected the stragglers and brought the whole lot quietly up to the gate, they divide into two streams and race off in opposite directions. I have seen three or four men thus engaged with a thousand lambs, not a score of which were driven into the fold in half an hour. One evening on the La Plata I was riding by an

"Estancia" where the owner and five or six mounted men were hard at work at this troublesome job, galloping about and shouting maledictions in the names of all the saints in the Calendar on the heads of the frolicsome creatures who refused to join their mothers in the "corral."

The Spanish language is peculiarly rich in expletives, and it was somewhat amusing to watch the fruitless efforts of the men, and hear the burst of anathemas that accompanied every failure, when I knew that the dog at my side would soon do more than the whole posse of horsemen to direct that stream of living quicksilver into the right channel. looking on quietly for some time, I rode up to the owner and politely offered my help, requesting, if he accepted it, to leave the affair entirely to my dog. He assented with very evident scepticism, remarking that it would give his men a rest at all events. A wave of the hand and a nod to the dog was enough, for he had all along been eager to go to work, and no doubt had watched with contempt the blundering efforts of the men. By this time the lambs were careering round in two divisions at some distance from the corral, and he knew that he must first bring them into one mob. Having done this, he bustled them sharply towards the gate, and as they were about to race past it, dashed ahead, turned the leaders, and pressing up against the checked mass, shouldered a number through the entrance.

"Que mira!" exclaimed the owner. Round the corral again went the mob, the dog keeping outside them, cutting off stragglers, and pressing them close to the walls. Then, as they came to the entrance, he again headed them and forced nearly half the mob into the inclosure. Some ewes had now come out to look after their lambs, which did not improve matters, but in a few turns more he had folded the whole flock, and stood at the gate until I went up and shut it. The natives had never seen such an example of first-rate shepherding as that, as could be guessed by their expressions of satisfaction and surprise. The owner, after

thanking me for my assistance, offered to exchange a couple of good horses for my dog; but I had to explain that nothing would buy him, and he would, besides, refuse to do any work except at my bidding. A flock of sheep soon becomes accustomed to obey such a dog. I never had any trouble in getting my own flock of ewes and lambs into the field When drafting out the lambs for marking the sexes, he could do the work of two or three men, by bringing up a dozen lambs at a time to the gate of the pen reserved for them, and hustling them through without letting one break back to the main flock. I never knew him lose his temper but once, when a ram took him by surprise by a broadside charge, and knocked him over. On recovering himself he raced after his assailant, and, catching him cleverly by the fore-leg, threw him upon his back, giving him what must have proved a severe shock. Dogs that acquire a habit of nipping the hind legs of sheep never compensate by the best work for the injury they do. I can suggest no remedy for this, for I have not, personally, been obliged to deal with it. It is probably induced by encouraging them to worry and kill other animals, a practice which should never be allowed with dogs intended for work among such timid and stupid creatures as sheep.

In some districts of the La Plata the natives train a large breed of dogs to shepherd a flock entirely unassisted. They are brought up with the sheep from their puppyhood, and even, I have been assured, often nursed by ewes whose lambs have died; but this does not abate their savage disposition. In order to prevent them leaving their charges they are, it is said, emasculated. After breakfast every morning, three or four of these powerful dogs are sent out to take the sheep to the pastures, where they remain all day and bring the flock home in the evening. It is extremely dangerous for any one but their masters to go near a flock thus guarded. I happened one day to ride too close to a flock, when three of these savage dogs rushed to the

attack. Though well mounted, they closed upon me rapidly, and, had I not drawn my revolver and shot the leader as he sprang at my legs, I should probably have been pulled out of the saddle and torn to pieces. Although the situation was serious, I could not but regret the necessity for killing that faithful fellow in the performance of a duty which so fully tested his courage and determination.

In the sheepdog we have one of the most remarkable examples of the suppression of a natural instinct; for to the unregenerate canine mind a sheep must seem specially created to be run down and killed. Yet here we find the colley, and, indeed, almost any other breed we may instruct for the purpose, devoting its physical and mental powers to the care and defence of its natural prey, and thoroughly enjoying the work. I have known excellent sheepdogs made out of the most unpromising materials. A large French poodle — a veritable Jack-of-all-trades, retriever, cattle dog. opossum hunter, and mountebank-who had been discharged from a troupe of performing dogs on account of his quarrelsome disposition, I was told-would trot about among the flocks at lambing time, and gently bid a ewe and her lamb move on, as though he had the deepest interest in treating his master's property with consideration. The sheep may have wondered what manner of dog they had to look after them when he suddenly recollected his old profession, and danced about on his hind legs every now and then; but it would not have been easy to match him for that persuasive way he had of managing a refractory or frightened flock. Another acquaintance of mine was a dog whose form betokened a cross between greyhound and bulldog-a lanky, broad-headed, and withal underhung specimen of intermixture quite comical to see—a cur in the ordinary acceptation of the term, no doubt. Lying out at night on guard by the sheep yards, many a severe and victorious encounter had he had with dingoes endeavouring to break into the peaceful fold, until he was speared by a party of blacks out on a similar sheep-stealing errand, which his vigilance frustrated, though at the cost of his life.

Assuming, as we are justified from the concurrence of all the evidence, that the dog was derived from several feral species, it is no easy task to determine at what historical period those differences which distinguish him from his wild ancestors had become established. There is scarcely anything, except perhaps the coat, to distinguish many colleys and Pomeranians from the wolf. The form of the skull and muzzle is the same; the ears are short and erect, and the general proportions quite lupine, though we know these breeds to have been under domestication for a prolonged period. But when and where did such marked forms as the bulldog, bloodhound, and greyhound appear? monuments answer this question partially at least. The figure of the dog appears frequently in Assyrian sculpture. but, though differentiation had evidently then begun to take place, there are no extreme forms. The Egyptians embalmed their lap-dogs with as much care as kings and warriors, but the mummies might be placed in Goldsmith's general category of

Mongrel puppy, whelp, and hound, and curs of low degree.

An inspection of the earliest Egyptian representations shows a pretty constant type, while among those belonging to the later dynasties may be found one scarcely differing from the present ownerless scavengers of Alexandria and Cairo, together with another form, lanky, long-muzzled, short-haired, and whiptailed, which might pass as a poor specimen of the grey-hound. A pair of these coupled together, one with the ears drooping, the other with them erect, clearly represent fast hunting dogs of light build, spotted, or rather blotched, somewhat after the fashion of the Dalmatian. A few examples, too, closely approach the form of our modern turnspits. More important in some respects is the mastiff-like figure on the tomb of Esar-haddon, which we may place at six and a half centuries before the Christian era, the stock,

perhaps, whence the Romans derived their short-face breed resembling the bulldog.

Though we cannot here trace any continuity of descent, it is evident that a considerable differentiation from its wolfish ancestors had been established in the domestic dog at a very early period; but whether this was effected by conscious or unconscious selection—designed or accidental variations—it is impossible to determine. We may, however, safely conclude that slight accidental variations have in every case of domestication suggested the production of variations by selection.

Surrounded as they were by predatory animals and hostile tribes, it is singular that the most pastoral people of the ancient world—the Hebrews—did not generally employ the dog as a guardian of the flocks and herds. Their "unclean beast" was not a favourite, nor even a humble servant of those patriarchal shepherds, and their annual loss of stock must consequently have been very serious. The dog is mentioned once at least in the Bible in connection with pastoral life, and in a manner not wholly contemptuous, when Job, referring to the esteem in which he had been held, and the rise of a generation of wealthy novi homines, remarks: "But now they that are younger than I have me in derision, whose fathers I would have disdained to set with the dogs of my flock." According to some commentators, however, the Book of Job is of very doubtful Hebrew origin.

It would be interesting, if it were possible, to ascertain where the Greeks obtained the dog, or the idea embodied in a piece of sculpture of the fifth century B.C., representing an animal of the Newfoundland type. We believe this breed to be derived from the North American Continent. How, then, did anything resembling it find its way to Greece? The coat and other characteristics betoken a northern origin, or at least a habitat and climate alien to Southern Europe. Possibly it may have come from the Caucasus, or the mountainous regions of the Ural, or even the shores of the

Arctic ocean, by way of the river systems entering the Caspian: it is impossible to regard it as an indigenous species. In any case, we have here a striking example of differentiation at least four and a half centuries B.C.

Considering how closely associated the dog was with the life of the Assyrians, Egyptians, Greeks, and Romans; how intimately it was connected with their sports—for Homer describes a boar hunt; and even their religious observances—how some of these ancient people preserved its dead body with scrupulous care, while others sacrificed it to their deities; it would seem most improbable that an animal—so plastic as it proves in our hands in the short space of a century—had not become very greatly modified by accident or design long before any systematic and scientific efforts had been made to bring about the changes of which monumental history affords so much evidence.

On the continent of America it had become domesticated at a time probably anterior to any of the records of the Old World; for sometimes the skull, or even the whole body, is found preserved, together with human remains, in the most ancient Peruvian graves. Older still, perhaps, were the dogs of the Stone Age in Europe; and though there are no means of ascertaining the period, both the North American Indians and the Eskimo had very early domesticated this invaluable animal. An immense time must have elapsed since the ancestors of the Eskimo of Greenland migrated—as Dr. Rae has established the direction—from west to east, and it was impossible that they could have done so without the assistance of trained dogs. Indeed, in every instance where he is found as the associate of man, the dog has undergone some modification, and often to a remarkable degree, departing from the typical form of any known wild species, and in those very regions where the wild species exist, and still maintain the lupine character. The European wolf is unquestionably the same animal as that which preyed upon the reindeer in France, Germany, and Britain, and was also the contemporary of the extinct elephantine monsters, the rhinoceros, the hippopotamus, and such great extinct carnivora as the cave-bear, the glutton, and the sabre-toothed lion.

Further back, in the Miocene gypsum of Montmartre, we have a vulpine form, scarcely, if at all, distinguishable from our familiar fox. Yet, within this interval (the feral forms still existing) have arisen all the strongly marked varietiesfrom the bulldog to the greyhound, from the toy terrier to the dachshund—seen at a modern dog show. Nowhere, except in the possession of man, is anything approaching them to be found. We search the whole globe vainly for any existing form of which they may have been the direct, unchanged descendants; and geology gives no countenance to the presumption that they originated in any one or more species, now extinct, of which our domesticated animals are the only remnants. Thus, we are inevitably driven to accept existing species of canis as the progenitors of our domesticated races, through the operation of the law of evolution; and there is no more need to invoke the aid of "special creations" for the origin of so valuable an animal, than for the production of so singular a bird as the tumbler pigeon, of hornless breeds of cattle, or of the absolutely new species of plants derived from wild forms by systematic experiment within the past quarter of a century-species quite permanent, and as fertile inter se and with both parents as are the different stocks of the genus canis, whether wild or domesticated.

It has been said of Mr. W. B. Tegetmeier, F.L.S.—a gentleman of world-wide renown as an authority on, and breeder of, pigeons and gallinaceous birds—that you might chalk out on a blackboard the figure of a pigeon or fowl of almost any form, and in a few years he would produce you a living copy of it. There may be a little playful exaggeration in that, but it expresses in a fashion the influence which man is really capable of exerting on the species that come within the pale of domestication. The close companionship of the

dog with man would lead to great attention being paid to the favourite animal, and the least observant people would hardly fail to perceive the result of crossing, and to endeavour to direct spontaneous variation by selection. Since this has been going on in different parts of the world, among various races of men, from a remote period, each race taking as its starting point the original indigenous wild stock or stocks of the country; and, since these races have in many instances come into contact, and crosses have taken place between their dogs, there has been a repeated mixture of blood to lay the foundation for the strongly marked variations of the present day. Then, also, in this century, or, more exactly, within the past fifty years, we have applied systematic methods to the breeding of all our domestic animals, and variation has progressed with rapid strides, especially in the case of the dog. Every breeder knows how comparatively unstable the more extreme of these variations are at present, and how strong a tendency the young often exhibit to return to one or other of the ancestral forms. He carefully weeds out and destroys the puppies that do not come true to his ideal, lest the reputation of his kennel should suffer by the appearance of anything true to Nature and false to art. He finds it impossible to suppress this evidence of the repeated mixture the blood of the dog has undergone, Reversion is thus constantly proclaiming the genealogy of the dog; though in the main we are on the way to the creation of permanent forms, if indeed we have not already attained permanency in certain directions. The breeder of bulldogs or greyhounds, for example, would probably love me little for doubting whether he has yet attained complete fixity of species; but if all the productions from the most carefully selected parents were allowed to grow up, a considerable proportion of them would be very far indeed from his standard of "breed."

I am inclined to regard the occasional subsequent appearance of young similar to the stock proper to a first alliance as merely the recurrence of one of those numerous varieties, of which

each of our domestic dogs-no matter what its breed-is in its own person an epitomised version. We do not feel any surprise when in an English family children appear who exhibit marked divergences from their parents in such important physical characters as the colour of the eyes, or even in the tendency to brachycephaly or dolichocephaly, because the English race of to-day is an epitome of many races, light eyed and dark eyed. short headed and long headed—varieties, however, which are not nearly so strongly marked as those which from time to time have entered into the blood stream of the domestic dog. cannot, then, see any difficulty in referring these cases to simple recurrence to an antecedent type. The whole ground is, to my thinking, completely covered by Hæckel's statement that "The series of diverse forms which every individual of a species. passes through from the early dawn of its existence, is simply a short and rapid recapitulation of the series of specific multiple forms through which his progenitors have passed, the ancestors of the existing species." When, then, any two individuals are brought together—as, for example, a pair of "thorough-bred" retrievers - each contains within itself an epitome of this series of specific multiple forms, and there can be no reason for astonishment that one or other of them should occasionally determine the reproduction or revival of one of these forms, varying even considerably from their own type, without reference to any immediate influence from an antecedent alliance.

My retriever, Carlo II., whose portrait is here given, is the descendant of ancestors whose history is personally known to me for three generations. The photograph from which the engraving is made has the effect of somewhat enlarging his head, and the position shows his fore quarters to disadvantage. He is now more than ten years old, is in good muscular condition, and weighs about 56lb. So well preserved is he that his incisors are all present, the cusps being scarcely worn off several of them, and the only indication of age is some tartar at the base of the upper canines. All the other teeth are sound



and absolutely free from even this sign of advancing years. There is no apparent diminution in his activity, for he jumps the same height as he did at three years old-clearing a four foot hurdle easily with a stick in his mouth. It will be obvious to those who are familiar with the modern retriever that no judge would look twice at him on a show bench, whence it would perhaps be more correct to designate him a "retrieving dog." Although he is small, shows some tan on legs, and has a feathered tail, and in no respect approaches the modern standard of perfection, which, I understand, is sometimes obtained by the help of a poodle strain, one of the most distinguished judges in this country has pronounced him to be "a noble specimen of a dog." Moreover, a more perfect workman, both as a pointing and retrieving dog, could not be found, "mongrel" as he is, with the blood of Irish setter, Irish water spaniel, and retriever in his veins.

In a feral condition the members of the genus canis are as savage as those of the genus felis, yet the former have come easily and almost voluntarily under our dominion, while the latter are still wild animals in all essential respects. writers have ascribed the association of the dog with man in the first instance to curiosity—to a desire to find out what so remarkable a being can be about in his various works and Capture of the wild young was necessarily the first step towards this association; but after that, it is contended, the dog became so interested in his captor that he remained to see the end of it, and finally elected to take up his permanent abode with man. In that there may be much truth. although no one can suppose that any wild dog come to years of discretion ever walked out of a wood, sat down before the wigwam of a savage, and then and there entered into partnership with him. Wild dogs do undoubtedly evince the keenest and also the most intelligent interest in the works of man, and refuse to be beguiled by them when they take the form of traps, spring guns, or any kind of snare whatever. This, at least, is quite certain, the young of wild dogs, and frequently the adult animals themselves, enter into association with us more easily than any other of the land carnivora. I am told by the keepers in the Zoological Gardens that they can do almost as they like with the wolves in the collection after some little acquaintance with them, though these animals have come straight from Asia or America, and their first real acquaintance with the human species has been under every disadvantage. A very powerful black Tibetan wolf, which at first rushed at the bars of the cage with all his teeth bared whenever the keeper passed, and displayed the utmost ferocity, soon became as docile and affectionate towards him as many domestic dogs.

None of the cats can be thus approached. I handled (in the presence of the mother) a dingo pup, born in the Gardens, without provoking her resentment. She retired shyly into a corner of her den, while the young one behaved with me in the friendly manner of a domestic puppy. During a recent visit to the kennel of Mr. W. K. Taunton, who was good enough to invite me to inspect a dingo he had recently imported direct from Australia, I had another opportunity of seeing how mild the manners of a wild species may become after very slight association with man. This formidable animal—a truly magnificent specimen of the species—on being let out in the presence of Mr. Taunton and myself by the keeper, took a run round the yard, and then made a critical examination of my trousers with his nose, and no doubt came to the conclusion that I was the possessor of a dog. He allowed me to handle him freely, seemed pleased with the attention, and paid me the compliment of taking my hand into his mouth, and mumbling it somewhat roughly, but obviously in playful mood. His lively and sociable manner indicated very clearly his satisfaction with his new human acquaintance; yet this dog not very long previously had been running wild in the Australian bush, hunting kangaroos, and regarding man as a diabolical creature, always galloping about on horses and keeping dingoes in a state of perpetual alarm.

CHAPTER IV.

The Senses—Examples of Vision—Examples of Hearing, and discrimination of Sounds in the Australian Bush—Examples of Taste—Dram-drinkers—Smell, acuteness and discrimination—Tracking Human Footsteps—Back Trail—Experiments on the Sense of Smell—Stone-hunting—Change of Habits from the Wild to the Domesticated State—Wagging the Tail—Barking—Origin of the Dingo—The Eskimo Dog—The St. Bernard—The Bulldog.

No one who has paid the most casual attention to the actions of dogs can doubt that their senses are developed to an extraordinary degree, especially those of hearing and smelling. That of taste also, which is so closely correlated with the latter, is much more delicate than we might be apt to conclude from the behaviour of the animal in some circumstances. Huxley under-estimated the power of vision, it seems to me, when he declared it to be much inferior to the same sense in man. Dogs do not, as can be determined from the anatomy of the eye, possess the astonishing power of adapting their vision to both near and distant objects, like a hawk, for instance, which can see a field mouse creeping in the grass while he poises himself on his wings a hundred feet above the meadow. The structure of the accipitrine eye at once reveals the secret of this almost telescopic power, enjoyed only by the Class of birds. Nevertheless, my own observations, as well as those of others, have led me to form a high estimate of this sense in the dog. It is not easy to make direct experiments. The animal must be carefully watched under conditions which render comparison with our own vision possible. Everyone knows how difficult it is for a swimmer to keep his eye on any object floating on broken water; it must be still more so for the dog, whose line of sight is lower. A correspondent of the Field, 1st December, 1883, gave the following instances: "I had been for a day's shore shooting on the coast of Calvados, and had dropped what is there called a petite de mer" (probably one of the stilts). "The crossbred spaniel plunged immediately into the surging billows, did brave battle with them for several minutes, never lost sight of the speck which was dancing wildly on the white-crested waves, and in due time retrieved the worthless little long bill. Another time, I had been looking for ducks along the partially frozen stream in the park, when a wood pigeon bolted from the elm trees, received a shot from me, flew across the end of a plantation, and then fell dead in a hedge between a field of colza and another of winter wheat. I went immediately to the spot, and in so doing had to chide the spaniel for a double attempt to enter the wood, This was the only slightly angry word I ever addressed to him, and he felt it keenly. Arrived at the hedge, a most diligent search was made, but in vain, and at last I gave it up and returned to the stream, when, for the third time, the dog made an attempt to enter the wood, succeeded in eluding my attention, scoured the corner of the plantation, and then emerged triumphantly in front of me with the wood pigeon in his mouth. He knew exactly where it had fallen. I had made a miscalculation, and then blamed the frosty morning for it. Do you suppose that Tom—that was the spaniel's name made me feel my inferiority? Oh no! The dog is far too noble and generous an animal to lower himself to the level of a question of amour propre, a truly human weakness."

Many sportsmen, especially those who like going out shooting with no other companion than a retriever, and care

nothing for a "bag" as such, but prefer contemplating the exercise of the dog's faculties, must often have experienced the accuracy with which he will mark a fallen bird. Over and over again on the Australian creeks has my retriever, Carlo I. (grandfather of the subject of the illustration), correctly marked a fallen duck among beds of reeds, or swamp grass, when I have far overwalked the spot or missed the One morning, in Moreton Bay, when the tide was out half a mile on the mud flats, a long shot at a teal failed to bring him down; he flew straight out to seaward, the dog intently watching him while I put another charge into the antiquated muzzle loader. Ah! the despised "spout!" Many a year since I handled one now; but how nicely that deliberate measuring out of powder and shot rested the dog, steadied our nerves, and gave us time for reflection. ever I find another opportunity for wild shooting over such a dog as that, I will put aside the modern weapon and once more take to the old "Purdey," converted from a flint to a percussion, with which my father more than half a century ago astonished the Cambridgeshire gunners by his performances on the snipe. That venerable weapon is as sound as ever, thanks to loving care; but it must not be desecrated by a modern pheasant battue or a grouse drive. Perhaps it may yet renew its youth in company with a first-rate retriever, and in the hands of one who still wants several good years to the half century.

Meanwhile the teal is flying seaward and has become a mere speck. I put up the small binocular which I always carry in a special pocket, ready set to focus, and watch him. Presently he towers a few yards and falls dead. I look at the dog; he has seen it too, and turns to me with a whining entreaty to be after it. Is it worth while to try? The mud is firm and safe, though cut up by little creeks; I therefore let him see what he can do, and, with a wave of my hand he is away on what I think an unlikely quest. Across the mud flat he races, in and out of the pools, keeping the

direction with astonishing accuracy. With the glass at my eye I see him, as I think, pass the spot. He goes slowly now, hesitates, retraces his steps some yards, and casts down wind to get the scent, but without success. A wider cast still, and up goes his flag. A few moments' steady quartering of the ground, and he has the bird in his mouth, and it is not long before he delivers it proudly into my hand. Great as the distance was—at least a quarter of a mile—he had marked his bird down within a circle of not more than forty yards diameter, to the best of my judgment, and moreover, went to work with a confidence my own assisted sight did not enable me to share.

Spoilt minion of fashion; thou of the battue and the drive, and the second gun ready to be handed by the keeper, as the long tails come rocketing out of cover by the dozen; believe me, that was worth the hecatombs of slaughter, the champagne lunch—and—but that would be rank treason-I was going to add, the plaudits of the fair come out in wagonettes to view the goodly rows of burnished plumaged pheasants ranged on the grass, while the tired beaters stand humbly at the corner of the wood expectant of broken meat. Spoilt minion—I am still apostrophising thee — where are the dogs? or, rather, where is thy dog, thy trusty companion, if thou hast one, and what part or lot has he borne in this pheasant-killing-by-machinery business? After the din, after the triumph and the vanity, after the rapture, such as it is, of having killed the largest head of game to your own gun; after the excitement, and the risk of being shot dead through the back by some irresponsible booby who trained his "'prentice hand" at a pigeon match—the manliest thing you have done to-day was to refrain from flinching when his gun belched out its contents at that bird rising straight between you-after all this what is there left? There are the slain, it is true, to your account; there is the envy of the party, and there is the certainty that my Lord Tom Noddy will invite you

again to a pheasant butchery, because you shoot well, and know a cock bird from a hen on the wing. But what does a hundred such days amount to? A blurred picture of smoke, fire, noise, and feathers, with nothing to distinguish one battue from another, nothing to leave an impression worth retaining. I have tried it, and, trust me, it is altogether vanity compared with a quiet walk with a dog along a lonely Australian shore, the interminable forest behind you redolent of aromatic gums in the fierce sun, a vast mud flat before you, and outside that the blue Pacific Ocean, a solitary teal, a long shot, and then the pleasure of watching the exercise of faculties in your dog which you even need not disdain to possess. Memory treasures those scenes, and reproduces them with marvellous fidelity years afterwards, affording an ever new delight.

During my boat excursions with a friend among the numerous islands and up the creeks entering Moreton Bay, it was the habit of this retriever to sit on the stern seat. sheltered from the sun by a little canopy rigged for his express benefit—for the hot sun punishes a black dog severely -and act as our look-out while we sculled the boat through narrow passages, and punted her over shallows, our attention being then fully engaged, lest with a falling tide we should be left stranded for several hours to bake in a temperature of 130deg. Fahrenheit, with the alternative of wading ashore over the mud, and being tortured by mosquitos under the shade of the mangrove trees. The dog proved very useful; for, on seeing duck either on the wing or sitting on the banks, he would whimper and call our attention to them at once, while gazing steadily in the direction. Then, if circumstances permitted, the boat would be paddled towards them, and one of us would get out and circumvent the birds. the other waiting in the boat for a chance shot as they came over. By this means many a fine duck or brace would be secured which would otherwise have been overlooked. The great distance at which the dog was able to see the

birds was a matter of astonishment to my friend Stanley Hall, a man of exceptional powers of vision, and a crack rifle shot, and even he sometimes was obliged to take up the binocular to verify the dog's sight.

I recollect one notable example of this. The wind had been increasing all the morning, with rain squalls, and about mid-day became too much for our miserably rickety boat; consequently we determined to run for a small island of two or three acres in extent, under whose lee it would be possible to pass the night in safety should one of the short but furious "Southerly busters" come on, which would be fatal to us if we should be caught in the five miles of open water that separated us from the mainland. For ten minutes or so our cranky craft had been running before nasty seas, Hall being at the sculls, and I busy shovelling the water out. Just as we came into the calmer water to leeward of the island, Carlo I. mounted his look-out station on the stern seat, and presently began to whimper. "What's the matter with the dog?" said Hall; "I suppose he saw a shark's fin, or he doesn't like this driving mist; there's no likelihood of any ducks hereabouts." "Well," I said, "he means something, depend upon it; scull the boat's head round to windward, and let's watch him." The object of this manœuvre was to ascertain whether he would continue to look in the same direction. As the boat first lay, his eye looked a point or two before the beam over the starboard side, and when she was turned his eye was fixed in a direction a point or two abaft the beam on the port side, as I find from a rough diagram accompanying the notes put down the same evening. It was clear now that the dog saw some object on the water, but neither of us could find it. I then took the binocular, and soon made out a large flight of ducks bobbing about on the broken water. Possibly the dog had seen them alight, and this would make it easier for him to keep his eye on them, though we could not find them without the help of the glass. This, at all events, was good luck, and

after praising him, and making him lie down in the boat we got the guns ready, put the steer oar out astern, and drifted down to leeward of the birds. A few minutes' steady sculling brought us within range for Hall's No. 10 bore with wire cartridges, and a goodly number remained on the water, the other barrel of the 10 bore and both barrels of my 12 bore doing further execution as the flight rose. When we pulled up to the island, and turned out "the bag," it amounted to nine ducks and teal. Had it not been for the ever-watchful eyes of the dog, that flight of birds would certainly have remained unnoticed by us.

One more instance, in similar circumstances, of keen vision on the part of the dog may be cited. On the shores of Moreton Bay, twenty miles or so to the south of the river Brisbane, was a favourite shooting ground, haunted by a few of the more adventurous gunners, who took boat and camped out for a week at a time, living on hard biscuit and the liberal rations provided by their guns. Some short distance from the coast were vast stretches of swamp, almost impenetrable on account of their boggy character and the hosts of bloodthirsty mosquitos. From these swamps to the mud flats of the bay large flights of duck were continually passing, and, as the tide rose and covered the salt water feeding grounds, the birds flew inland again to the fresh-water swamps, which were drained by a tidal creek of considerable size during floods. Ducks, as every gunner knows, have a habit of following the direction of water-courses, even when they could make a shorter line Some quarter of a mile to the southward of the mouth of the creek was a point of land reaching boldly out into the bay, and all the birds coming from that direction rounded the point before entering the creek, where a few low bushes afforded cover enough for the sportsman. Behind these I established myself with a companion and my retriever, Carlo I., during several successive afternoons, at the rising of the tide, to take the ducks by a flanking fire as they turned to enter the creek. With the old muzzle-loaders we could, of course, never get a chance of more than four barrels at them, but generally the dog had the pleasure of retrieving three or four, sometimes six birds. From our place of concealment they could not be seen when rounding the point, and flying low with the land as a background, except by the help of a binocular, with which each of us in turn kept on the look out. The silent movement on the part of the watchman of putting down the glass and lifting his gun was the signal to prepare for action, and in a few seconds the birds were streaming past in their arrow-like flight, and presently the dog was busy at his retrieving work. In the meantime, it must have occurred to his mind that there was some object in the steady gaze I directed towards that point when it was my turn to use the glass, for, after the first hour or so, he turned his attention with obvious expectation towards the point of land, peeping through the bushes, and even creeping out of cover to watch.

I soon became convinced that he saw the birds rounding the point as soon as I did, and he watched for them as eagerly as ourselves. A little shiver of excitement, and the cocking of his ears, even occasionally before I was myself quite certain of their approach, was an indication not to be neglected. Accordingly, I left him to watch alone, and only when he exhibited these signs of interest put the glass to my eye for a moment and proved him to be right. It was scarcely credible that he should be able to detect them at that distance: but on the second and succeeding days we discontinued the tedious use of the glass, and trusted solely to his sight. At the first sign of excitement, we ordered him to lie down, and took up our guns in complete confidence, always justified that the signal he gave was correct, and thenceforth trusted entirely to him. As an example of intelligence it is interesting, but I think it proves the sight of a dog to be quite equal, and even superior,

to that of the average man. My companion, however, was one of the crack rifle shots of the colony, and endowed with exceptionally far sight, for I have often heard him correctly call out the position of a shot on the target before the flag went up, and when other riflemen could not see it. On this occasion he was much struck with the dog's performance, and remarked to me: "Well," I should not have thought that Carlo's sight could equal mine, and with the glass too." It should be explained that the binocular we used was one of low power and large field, only suitable for a theatre, but it appreciably extended the range of vision. This and many other instances, both with the same and other dogs, inclines me to attribute to them a power of vision not by any means inferior, if not superior, to that of other mammals, and Mr. Hugh Dalziel tells me that his experience leads him to the same conclusion.

Whatever difference of opinion may exist on this, there can be none with respect to the acuteness of the sense of hearing. Opportunities for verifying this have often occurred to me when camping out alone in the bush with the retriever above mentioned. I had occasion to make a journey through a part of Australia infested by very hostile tribes of blacks, sleeping at shepherds' huts when fortunate enough to meet with them, but more frequently compelled to do the best I could, rolled in my blanket, under the canopy of heaven. It was not prudent to keep the fire alight after dark, on account of the chance of attracting the natives, who would not hesitate to crawl up and hurl half a dozen spears at the sleeping figure for the sake of appropriating the few pounds of salt or dried beef and damper, and the few ounces of tea and sugar in the traveller's saddle bags. After cooking the evening meal then there was nothing for it, whether wet or cold, but to rake out the fire and turn in. These little encampments in the bush-the saddle, the saddle bags, and the sausagelike thing in the blanket—seem to excite the curiosity of cattle. In the early mornings, when they are moving off

their camps to feed, or on moonlight nights, they will creep up in a circle to within twenty yards of the sleeper, and stare at the strange object, as though lost in wonder not unmixed with dread. If the cracking of a stick happens to rouse one, the ghostly forms may be seen dimly and silently advancing through the forest until they stand in a serried rank around the sleeper. To the tyro, who suddenly wakes and finds himself thus the object of attention on the part of a hundred or so of wild cattle, the situation is almost alarming. But no thought of aggression is passing in their minds. They are simply attracted by the unknown and, to them, therefore, the terrible, while their nerves are strung to the highest pitch. An amusing scene may be created now by the man in the blanket suddenly rolling himself towards their ranks. The thing they have been watching has become endowed with life! They swing round in the utmost terror and confusion, dashing against each other in their hurry to escape from the awesome creature, and for the next few minutes the forest resounds with the thunder of retreating hoofs.

Carlo I. was perfectly familiar with these experiences, and would simply raise his head, look at the cattle, and curl himself up again without uttering a sound. Frequently, too, the thud, thud of a kangaroo leaping may be heard; but the dog would pay no more attention to the movements of these and other animals than to those of cattle.

Camping out one night in company with him, he roused me a little before daylight, in his usual manner, by pawing my shoulder, and, looking steadily in one direction, gave a low growl. I reached for my revolver under the saddle, and, lying at full length, fired a shot low at a clump of wattles, where a native might have concealed himself; however, there was no apparent result; but if the enemy were about, they would take that as a significant warning. I watched until dawn, the dog meanwhile evincing continued uneasiness, for which I cannot but think he had sufficient justification; for,

on continuing my journey, about a mile from my camp I found the temporary bark shelters, where a considerable number of natives had passed the night, with smoke still rising from the ashes of their fires. There can be little doubt that some of these people had been prowling about in the early morning, and perhaps, approached me with anything but friendly intention; if so, the keen ear of the dog had enabled him to detect so faint a sound, quite inaudible to me, as the footstep of a barefooted man, and to discriminate between this and the sounds made by animals, with which he never concerned himself further than merely to notice them, but gave no warning sign.

During one particular week of my bush life I could not aver that I had slept uninterruptedly for two hours. All around the neighbourhood the blacks had been spearing cattle and raiding on sheep. Their numbers and the shorthanded condition of all the sheep runs emboldened them to an unusual extent. At one of the far outlying huts they had murdered an old shepherd, and made havoc of his flock. To this hut I was sent with a flock of strong wethers, as all the grass nearer home was needed for the lambing season then close at hand. Extreme caution when out with the sheep was necessary, but in the monotony of the occupation -the ration carrier being the only white man likely to be seen in the course of a week, or, possibly, a stray stockman on his rounds—the feeling of insecurity gradually wore off. One hot day, while the sheep were taking their siesta at noon, I sat down at the foot of a tree with the double barrelled gun across my lap and the dog beside me, and fell asleep. Men naturally sleep lightly when they know that they may wake only to find a spear in them, and an angry growl from the dog brought me to my senses. Jumping to my feet, and, following the direction of his eye, I noticed a slight movement of the grass at some little distance, Concluding it to be a dingo making for the sheep I fired a charge of heavy shot at the spot, and, much to my astonishment, a

black fellow sprang up, ran a few yards, and then fell. Until then I had never seen a black skin since I took the hut, but when least expected the enemy was upon me. He had managed his approach with excellent judgment, coming from the side where there were no sheep, which he would have disturbed. Here was a great blunder on my part. Before relaxing my vigilance I ought to have seen that there were sheep all round me, so that any movement on their part would have put me on my guard. It is needless to say that I gathered the flock together at once and made for home, avoiding the direction in which the native had come, as he would probably have several companions, who, however, would be chary of showing themselves at least, in open aggression, after that lesson.

It is difficult to attribute this warning of the dog to any sense but that of hearing. Redolent as the Australian native is when you are to leeward of him, in that hot, dry, still, mid-day air he would give out little scent likely to reach the nose of the dog. Sight is out of the question altogether. The native's method of stalking-and no savage in the world excels him in this-never permits him to be seen. Wherever there is grass enough to hide him at all he crawls along with his spear grasped firmly between the great toe and the next, and his "nullah-nullah" or club in his hand. Reaching a tree he stands up to rest and pick the ground for a further advance. Should vou happen to look straight at that tree, round which onehalf of his face is showing, it will present the appearance only of a knob on the trunk, and will not attract notice, and there it will remain motionless as long as you look. Thus warily moving, the native is able to stalk even right into the midst of a mob of kangaroos, whose first intimation of his presence is the fall of one of their number to his spear or club. Stalking a drowsy shepherd is obviously a far easier task, unless he is protected, as in that instance I fortunately was, by the vigilance of a dog whose

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perceptions so far transcend those of man in sensibility and discrimination.

The intimate physiological association of the sense of taste with that of smell renders it uncertain, in some instances, which of the two is in operation at any given moment. Everyone, however, must have noticed the extreme fastidiousness of taste in the dog, and there can be no doubt of his power of detecting minute quantities of substances which are disagreeable to him. I have experimented with various substances, both harmless and more or less dangerous, and have invariably found him capable of discovering their presence, even when diluted to an extreme degree. and when the human palate was unable to detect any trace of the substance. One day in the summer I took Carlo II. and his companion, Hector, my second retriever, for a long walk, and on their return, when suffering much from thirst, dropped ten drops of ordinary Kinahan's whisky into their basin containing a quart of fresh water, and secured the thorough mixture of the spirit by agitating the water for some time. On placing the vessel on the floor they both made a rush at it, took a few eager laps, and turned away in disgust. No coaxing availed to persuade them to touch it again. I then emptied the basin, rinsed it out, filled it with fresh water, and placed it before them. They clearly understood that some change had been effected-for I was in the habit of replenishing it when it had stood some hours and become a little stale—and approached it, though somewhat suspiciously, and, after tasting it, and being satisfied of its purity, took a hearty drink. Thus, it appeared, they were able to detect the presence of the spirit in so minute a proportion as about one drop to a thousand. I have tried various essential oils, petroleum, Condy's Fluid, &c., with much the same results, but the degrees of perception have varied. Carbolic acid seems to be specially objectionable. Neither beef tea nor strong meat broth suffices to mask the peculiar flavour of that acid. Even so negative a substance as a

small quantity of powdered sulphur introduced into a mess of soft food, and thoroughly mixed with it, will often be detected by a dog unaccustomed to it. This is impressed upon my memory by the difficulty I experienced in training a retriever to take this most useful alterative, which should, I think, be given at least once a week to the extent of a thimbleful to every dog weighing 50lb. or more, even if his health be good, with half that quantity to smaller animals. The dog in question did not overcome his repugnance to the sulphur in the smallest dose for months. Salt may be tolerated in much larger quantities than other substances, though a few grains will suffice to make my retriever refuse his water, unless very thirsty, which indicates his consciousness of its presence.

Veterinary authorities no doubt rightly consider that salt in any form whatever should never be given to the dog. I know one singular instance, however, of no evil result of frequently drinking salt water. We used to take a pointer to the shores of Moreton Bay, on the north-east coast of Australia, to work the quail and "squatter" pigeons in the rough grass round the salt swamps-birds in which my retriever, Carlo I., took no professional interest at that time, his mind being wholly devoted to water fowl and snipe. Even in winter the temperature of this latitude (28deg. N.) is little, if any, less during the day than that of an English Midsummer, while that of the autumn is considerably higher. My diary gives records of 84deg., 90deg., and 75deg. as the temperature in the shade on days in May, and of 70deg. frequently in the months of June and July, when it may be Thus, during the best shooting months the considered cool. heat is distressing to dogs, and particularly so to pointers. Carlo I., having been bred in the country, heavy-coated as he was, always worked without much apparent discomfort, and often accompanied me over Taylor's Range on the hottest days, sharing only the contents of a small flask carried on my belt, out of which he learned to drink as I poured

without losing a drop of the precious fluid. The march down from Brisbane to the Bay—some twelve miles—used to distress the pointer severely, and when we arrived at about 10 o'clock at one of the sandy coves, with its clear water, he would plunge in and sit for some time immersed up to his neck, taking a drink by absorption through his skin. I never saw him touch the water with his tongue; but Carlo would go in and drink freely as he swam about, and work all day in the heat afterwards, none the worse for a pint of the Pacific Ocean in his stomach. No other dog I ever knew or heard of would touch salt water even when in the utmost extremity, but he so frequently drank it that the practice may be said to have been habitual, yet it in no way affected his comfort or health.

Notwithstanding their universal natural reupgnance to intoxicating liquors, dogs, like many other animals, may have their tastes artificially vitiated, and become confirmed dram-drinkers. This was conclusively proved by the experiments of French physiologists on the effect of alcoholic poisoning. They made habitual drunkards of various animals. including domestic fowls, one of which was said to be able to take a bottle of wine daily. Personally I have not had any aquaintance with dipsomaniacal dogs, but the following cases, given by correspondents of The Country, clearly establish their existence: "I have a small toy terrier, upwards of 20 years of age, which, although partially blind and deaf, is in excellent health and active in habit, takes whisky and water from a tumbler, wine glass, or teaspoon, with great relish. She is also fond of biscuit soaked in brandy and water. The spirit was first given to her some years ago, as a remedy for rheumatism, apparently with good effect, and she now looks regularly for her nightcap of grog before going to bed."

The following is somewhat remarkable on account of the sudden cessation of an established habit: "I have in my possession a black and tan terrier about 6 or 7 years old. When a puppy we gave him with a teaspoon occasional

doses of gin to stop his growth, and I must with shame confess that more than once he became drunk and incapable. After a while he seemed to take quite a liking to his grog, until one day, someone having been taking some rum and honey for a cold, put a few spoonfuls in a saucer, and placed it before Toby on the floor. He immediately began lapping it up, and, after wincing a little at the strength of the spirit, licked the saucer dry. The result was that Master Toby finished the evening lying on his back upon the hearthrug, with all four legs extended perpendicularly. The next morning melancholy was the spectacle presented by the debauchée of the previous night. With head drooping and tail hanging straight down he wandered about, evidently seeking repose for his aching and bemuddled brain. If we could have got him to take it, we should have offered him some soda water and brandy, or a Seidlitz powder; but, strange to say, from that hour to this nothing can induce him to drink out of a glass or spoon, and if he is shown a tumbler he immediately retreats under the sofa or table, having evidently (mentally at least) signed the pledge, and meaning to keep it."

The whole mammalian class presents nothing more astonishing in function than the olfactory sense of the dog. some of the invertebrata this sense may possibly be even more acute, for Dr. G. T. Romanes' splendid investigations into the nervous system of the Echinodermata have shown the olfactory sense of those simple organisations to be so highly developed as to almost entirely appropriate to itself the functions of the nervous system, and to be the only guide to their food. But we search among the higher animals in vain for evidences of perception and discrimination by means of this sense at all approaching the results attained in the dog. Some physiologists have questioned whether it does not differ in kind as well as in degree from the same sense in man and other animals. In degree it certainly differs to an extent of which we can form no subjective idea, and it may possibly be negative with regard to

some odours. Dogs do not seem in any instance to take pleasure in scents which, like valerian, attract cats. I have presented a great number of different flowers, all more or less pleasing to us, to the noses of dogs, but never could detect any sign of pleasure or aversion in their behaviour. Neither have they ever rolled on them when laid on the floor, which is the canine mode of expressing delight in carrion. Has, then, the odour of the rose, violet, heliotrope, or lavender no effect at all on a dog's sense of smell, or does it merely give him no pleasure? He evinces no repugnance to wormwood, aniseed, and some other scents objectionable to us, but always turns from essential oils and perfumes, though they may be derived from vegetable substances which do not affect him when not combined with spirit. It is probably, then, the pungency of the alcoholic vehicle that repels him. Vegetable odours per se must either be inappreciable to him or unattractive; all mineral oils are repugnant.

The animal world is unquestionably the field for the exercise of his sense of smell, and here its power of discrimination is no less remarkable than its acuteness. I have no personal experience of the effects of any other scent-producing animals on the dog than the skunk, the mephitic odour of which is no doubt as intolerable to us as to him. Few dogs will kill a skunk after once experiencing a shower of that noisome secretion, but those that allow their momentary pugnacity to overcome their recollection of the infliction are a curse to their owners and everyone they approach.

In view of the indifference or dislike exhibited by the dog to odours pleasing to us, his habit of rolling himself in carrion of every kind is not easily accounted for. All putrescent animal matters appear to have this fascination for him, from a dead dog, or cat, or bird, to a frog or a snail. Once only have I noticed the indulgence of the habit in the case of a vegetable substance. Mr. Hugh Dalziel, however, tells me that rolling in decaying cabbage, etc., is by no means an uncommon practice. In one of the dense Austra-

lian scrubs I observed my retriever vigorously anointing himself after the manner of his kind, and on going to the spot found that he was rolling on a clump of living fungi which emitted a particularly evil smell. The large proportion of nitrogen, however, in fungi may give them a scent similar to that of animal matter. Dogs will go long distances to a particular place, day after day, to thus indulge themselves. I have sometimes thought that the ammonia evolved during putrescence may be in some way pleasing to them, as there is reason to believe that it is in other circumstances; but when I have saturated blotting paper with a weak solution of ammonia, and placed it before them, they have turned from it with indications of dislike. I have not formed any definite theory of the origin of this habit, though there has always been floating in my mind a suspicion, unsupported it must be confessed by any direct evidence of its possible association with the reproductive instincts.

In his work on "Mental Evolution in Animals," Dr. G. J. Romanes shows that he has considered it from the point of view of inheritance, and, since the laws of transmission of mental phenomena are now-thanks to the works of that writer and of Sir John Lubbock, and others who have enlarged on and ably illustrated Darwin's doctrines—so much better understood than formerly, much new light has been thrown on obscure instincts. Mr. Hugh Dalziel writes to me on this subject: "At one time I thought, or rather wondered, whether the habit of rolling in carrion and other decayed animal matter had originated as a means employed to enable dogs to trace each other, just as micturition appears to serve that purpose. After reading Romanes' book I became confirmed in an opinion that had been growing with me, that, taste and smell being closely allied senses, rolling in carrion is an inherited habit, causing pleasurable sensations from association with the glorious feasts enjoyed on the battlefields, and on the putrid carcases of animals, for which dogs, when unrestrained, still often display a strong relish."

The principle of inheritance here invoked has been held sufficient to explain the ardent desire of every boy, and even of many girls, to climb trees-not merely for the purpose of taking birds' nests, or of gathering fruit, but for the very enjoyment experienced in the act of climbing. If man, whose structure is now but poorly adapted to this end, feels a subtle pleasure in getting into a tree and swinging on a branch, and if, as seems probable, this is an unconscious reminiscence—the inherited remnant of a constant habit of a far distant ancestor who passed an aboreal existencethere is nothing extravagant in attributing the action of the dog similarly to the law of inheritance. But, if we admit this, can we account on the same ground for our own penchant for game in an almost putrid condition? In the early days of man's tenancy of this earth, when the struggle for life must have been much more severe; when his sole dependence was on the chase; when agriculture was unknown, or at least unpractised, in times of scarcity, decomposing animal matter must have frequently afforded the only means of sustenance. Hence, then, possibly, and even probably, the grouse, hare, or venison, which now comes to our tables in a state of actual decomposition, represents a taste acquired ages ago by the conditions of primitive life, and is not to be distinguished in origin from a habit which brings upon our domestic dogs the severest reprobation and prompt chastisement.

In my own experience there is no foundation for the opinion, entertained by many sportsmen, that a dog's powers of scent are temporarily or permanently affected by the indulgence of this habit, though the presumption would certainly be in favour of that view, judging from analogy with ourselves. No human being, we may suppose, whose sense of smell was entirely usurped by the odour of patchouli, would be likely to detect the indications of the refined natural perfumes of the violet or rose. But in the case of the dog we are considering a sense altogether beyond our

own in range, exactness, and discrimination. Speaking only of my retrievers, who would find, stand, and recover their game—thus combining all the work expected of sporting dogs—it has never alarmed me to see them revelling in carrion before or during the time when they were expected to prove their powers. Carlo I., who rarely lost a wounded bird among the many thousands he brought to bag on land and water, was incorrigible in this respect, and there were abundant opportunities for testing him in the hot climates of Australia and South America, where putrid animal matter festers under the sun. Soon after saturating his coat with ordure, he would work out the trail of a wounded duck on wet ground with unfailing certainty, while I, on taking the bird from his mouth, could hardly endure the effluvium that enveloped him.

Some years ago, when shooting on Dartmoor with Mr. Irwin Cox, an opportunity presented itself to me of calling his attention to this, his impression then being that the smell of the carrion must render the dog's nose useless. For a week previously we had daily made good bags of snipe, woodcock, and plover, with a few duck, and, now and then, a blackcock, over this Australian-bred retriever, who found, stood, and brought to hand any kind of game. Soon after the start for the moor one morning, Carlo I. was seen to be busily engaged perfuming himself on the remains of a decomposed rabbit, cast upon a dungheap. Mr. Cox suggested leaving the dog at home, insisting that he would be worthless for the remainder of the day. The incident, however, did not concern my mind, and we went on the moor under a cheerful sun, with every prospect of sport. The snipe lay close, feeding greedily in the soft places, and Carlo I. found and stood them splendidly, and retrieved them throughout the day in perfect style.

The bag included snipe, woodcock, partridge, and hare, with a duck, cleverly recovered, after a laborious hunt among thick reeds and grass and pools of miry water, without any assistance from us. Discussing the day's work in the evening over a comfortable peat fire, with the dog lying snugly on my railway rug (see to that my brother sportsmen, as you love your faithful friend), Mr. Cox was fain to confess his confidence in a thoroughly experienced retriever's nose, which indulgence in an hereditary instinct did not demoralise.

Many sportsmen appear to entertain the opinion that if a dog eats the bones of game he will lose his "nose." This seems to me antecedently most improbable, and the facts within my knowledge do not support it. Well fed sporting dogs refuse game, and notably waterfowl, as food, though no doubt they will eat these when hard pressed by hunger or when their food is too largely composed of farinaceous matter; for a considerable proportion of animal food, probably onethird at least, is essential to the health of a pointer, setter, or retriever in full work. My Australian retriever was sometimes reduced to the necessity of eating duck for two or three days together during our excursions in Moreton Bay, the small allowance of biscuit we were able to apportion to him being insufficient. The half of a well-roasted duck was not despised after the day's work, though he would touch nothing of the kind when any other flesh food was to be had. Nevertheless, his scenting powers did not fail in any respect either then or subsequently. The loss of this sense may probably be attributed to a different and obvious causelong standing catarrh in the nasal passages, occasioned by that partly ignorant and partly selfish neglect with which dogs are too often treated when they come home exhausted and cold and hungry, while their master goes to his comfortable fireside and hot dinner. We need not be surprised if the delicate membranes, which act as receiving surfaces for the odours, become thickened by prolonged inflammation, and eventually lose all sensibility. If the pointer were liable to have his faculty of scent injured by eating the bones of a partridge, how much more should that of a hound be vitiated by a good mouthful now and then out of a rank dog fox?

It is impossible for us with our obtuse senses to realise the extreme delicacy and discriminating power of the dog's nose. What odour can we conceive the imprint of a stag's foot to leave behind it? Yet the dog detects something long after the animal has passed over the ground. For twenty minutes after the stag is released from the cart enough remains of his odour to enable the hounds to go off in full cry. More remarkable still is the power of discrimination shown in distinguishing a "forward" from a "back" scent, which I believe experienced hounds can do without fail. Unless a hunting animal could ascertain by some difference in the scent which way an animal had gone, he could only catch it by accidentally hitting on the right direction; but when hounds come across the trail of a fox or hare, we see them run here and there for a few moments, and finally settle down on the forward scent. Is, then, the scent of each succeeding footprint appreciably, however slightly, stronger than the last? In experimenting with my own dogs, I have walked in and out among the shrubberies and flower beds, and round sticks set up at intervals on the lawn of a large pleasure ground, and then from a place of concealment watched them running the trail. The person who was instructed to release them within a given time-say five minutes-would, in accordance with direction, lead them across some part of the trail at a spot previously agreed upon. For a few moments they might run about casting wildly and excitedly, but this hesitation was soon replaced by confident hunting on the forward scent.

The difference in the facility with which even first-rate retrievers, and, indeed dogs of all breeds, are capable of tracking their masters is very marked. Carlo I. was the most accomplished man-hunter among my own dogs, and I never met with his equal anywhere. The circumstances of his early life may account for this. When he was just able to carry a duck he used to accompany me to the small creeks on Moreton Bay to be introduced to the business

of retrieving live game. Among the dense patches of scrub and thick forest there it is an easy matter to lose a dog who runs off for a hundred yards on the trail of a wallaby. This repeatedly happened with Master Carlo, and, being reluctant to establish the bad habit of bringing him back by call or whistle, lest a shot at a duck might be lost, I used to stand still and wait for him. Finding the wallaby too fast for him, it may be supposed he gave up the chase, and then became suddenly struck with the consciousness of being lost in the bush. Sometimes I could catch sight of him running hither and thither in a bewildered way, presenting quite as touching a spectacle of mental distress as any lost child.

Watching him from behind a tree after he had made several excursions with me into the bush, I had an opportunity of observing the beginnings of the man-hunting accomplishment. He looked about him, stood still, listened attentively, lifted his head and howled, then ran on aimlessly, occasionally dropping his nose to the ground, as if impelled by some internal impulse, not, I thought, with any conscious intention of using his nose. This went on for some minutes, until he accidentally passed within a few yards of the tree, got wind of me, and rolled on my feet with delight at having found his master, and relieved an anxiety which had been as grievous in its way as we ourselves could experience. We can all understand what passed through that little canine heart bereaved in the wilderness—the heir of all the ages of domestication, separated from all it knew of companionship and sympathy, its feelings so pathetically expressed by the mournful wail sent up in the sombre gum forest. But we cannot understand that fitful dropping of the nose to the ground on any other supposition than that it represented the unconscious exercise of an hereditary racial instinct of over mastering force, called forth by the present stress of circumstances. When once the generalised instinct is thus called into play, its application to the settlement of any

particular question arising in the animal's mind would follow with experience; and the dog must eventually learn to hunt his master's trail. Before this dog attained the age of twelve months he had made himself an adept at manhunting, and, however intricate the bush might be, I had no fear of losing him.

When, then, I had some trials with him in England at about four years old he tracked me with a certainty that I have not seen attained by any other dog. In a seven acre meadow, containing several isolated trees, I walked barefooted one morning a course of perhaps half a mile round about, doubling several times on my track, and passing round the trees in a particular order, and finally climbed into a tree, where I was sufficiently hidden by the foliage, and watched. A few minutes after I had taken up my station a friend led the dog into the meadow and released He cast about, and was very soon on the track. hunting it close, on an evidently hot scent. There was no appearance of more than momentary hesitation at the spots where I had doubled, and he passed round the trees in the same order as myself. On coming to the tree in which I was concealed, thirty feet above the ground, he hesitated, made some wide casts round, and returned to it in much perplexity. It did not seem to occur to him that I might be up above, but he was, at all events, convinced that there the trail ended, and kept running to and fro a few yards and whining with disappointment. I then came down and commended him for his capital piece of work.

This is a great amusement, or rather, an interesting study for those who possess an intelligent dog who has been trained to use his nose in finding wounded game, and I should think that very few dogs still in the enjoyment of intact olfactory organs—such as Newfoundlands, bloodhounds, colleys, setters, pointers, retrievers, spaniels, foxhounds, Scotch deerhounds, fox terriers, and Skye terriers—would have much difficulty in making a good show in this respect, provided always they

are sufficiently attached to their master to make the effort. Whether bulldogs and pugs, with their contracted nasal bones, or any of the degraded creatures used as lap dogs, would evince any such aptitude might well be doubted. But that bulldogs are not wholly incapable of this is certain.

The retriever above mentioned was so well known among friends and acquaintances for his faculty of discovering my whereabouts in most difficult circumstances that I was often asked to give an exhibition of his powers. While looking on at a cricket match in a county town this became the subject of conversation, and it was suggested that I should tie the dog up, walk home through the town, and leave directions that he should be let loose in half an hour. That would have been no considerable task for him, but I do not choose to let my dogs run the risk of being maimed by that species of ruffian which always is on the look-out to fling a stone at a dog when his master is not at hand. As soon as the match was over, however, I gave him in charge to a friend, with directions to allow me five minutes' law. The people were then crossing the ground in all directions. I walked to the other side of the ground among them, got over the fence, and hid myself in a ditch on the opposite side of a large field. When released, he hunted my trail slowly. I was told, but with no hesitation; and from my place of concealment I saw him jump the fence where I had climbed it, and came racing along the scent, never lifting his nose until he rushed into the ditch, much surprised and delighted at having found me so soon.

Now, in all probability, my trail across the cricket field was cut up into a hundred short lengths by the footsteps of others, and these were, therefore, so many elements of distraction in the pursuit of one scent; yet he was able to pick out the desired trail with certainty. Had anyone of the owners of those footsteps been the master of the dog he would, no doubt, have been equally certain of following them. Every footprint must have given a distinct scent,

which he perceived, but neglected in favour of that which he was intent on following. It must, indeed, be a marvellous faculty than can thus entertain in the sensorium a succession of varied perceptions and, at the same time, take account only of the particular impression it is desired to retain as associated with the presence of some individual man. It would seem that every human being has some special odour proper to himself, and distinct from that by which the dog recognises the genus homo in general, and distinguishes man from any other animal and from birds. We could never have known this but for the behaviour of our dogs when seeking their masters. Further, I have reason to believe that they know by smell—i.e., can recall to memory the identity of people with whom they are familiar without seeing them at the moment. Reference will be made to this presently.

Some naturalists have supposed that the man is traced by the dog by reason of some peculiarity in the leather of his boots. That explanation does not agree with what my experiments—so far as they go—indicate. In the first place, my dogs, have hunted me, at least, on grass, with more confidence and certainty when I walked barefooted than otherwise. New slippers and boots, which I have tried, puzzled them all, and one of them would take no notice whatever of my trail when I was shod in any kind of new foot covering; though even new boots did not prevent Carlo I. from making out the trail with some difficulty while quite fresh. One summer morning, being with a friend in a large park, I suggested that we should change boots, and that he should cover the dog's eyes, and presently let him go in search of me. It was a complete failure. For the first few yards (as he told me), there seemed to be a trace of me in the air, and the dog kept on the track, but soon became uncertain, and finally gave up the quest. On another occasion, I rubbed my bare feet with paraffin oil, and walked very leisurely across a lawn for a distance of, perhaps, a hundred yards. The dog was unable to track me. A few days after this I rolled across the lawn the same distance and he ran on the trail with confidence.

Presuming from these trials that every part of my body left some trace of the special odour belonging to me, and associated in the dog's mind with my individuality, I determined to extend them whenever a favourable opportunity presented itself. But unfortunately the series I had planned could not be carried out systematically, for he became languid and indisposed for exercise, and within two or three months died of aneurism on the aorta. However, I ascertained that he was able to track me with great ease riding on a bicycle and trailing my coat on the ground by a string, but with more difficulty when I used a felt hat or one of my boots in the same way.

Hunting on a back scent is an accomplishment which seems to imply much discrimination. It would be an unwarrantable supposition to entertain that few dogs are capable of this, but, with a considerable acquaintance among good retrievers, I have seen only two—Carlo I. and his grandson—perform this feat thoroughly well; though, probably, any well trained retriever would prove equally expert if the necessity presented itself to his mind.

I am bound to confess that I did not think of it as even possible, until Carlo I. showed quite unexpectedly what he could do. In stalking a kangaroo for some time in a dense scrub with no result, my powder-flask fell unnoticed out of my breast pocket. Valuing the article as the gift of an old friend, I determined to make an effort to find it, though the difficulty of retracing my steps through thick wattle bushes and interlaced creeping plants appeared almost insuperable, especially as there was nothing in the way of a landmark, where the stem of each tree was exactly like every other, and the few open spaces I had crossed were covered with a uniform growth of ferns. For some minutes I wandered back as nearly as I could in the right direction

rather with the hope of finding the object of my search by a happy accident than with any expectation of succeeding by systematic efforts. At a certain spot I had crawled through the ferns for some distance on hands and knees, and there, probably, the flask had fallen from my pocket. could find this spot there might be some chance of picking up my trail by following the line of bent and broken ferns, but that place, could not be, I knew much less than half a mile away. Seeing me intent upon some object which he perceived by my manner and downcast eyes could not be sport, the dog looked up in my face inquiringly, and it then occured to me, as a forlorn hope, to try the experiment of crying, "Seek, there, boy." If one may be permitted to make an attempt at divining a dog's thoughts, a train of reflection would seem to have passed through his mind in this wise; "No shot has been fired, therefore there is no game to find. What, then, can my master mean now by 'Seek there'? Surely, he must intend me to look for something belonging to him, as he often does when he hides a boot or some other thing that he has handled and sends me for it. Well, I can always do that by following his scent, so I can now." Those who believe with that great philospher, John Locke, who, by-the-by, nowhere in his works evinces any considerable knowledge of animals, that "the power of abstracting is not at all in them that they do, some of them in certain instances reason, but only in particular ideas, just as they received them from their senses," will by no means allow me to attribute to the dog even so simple a generalisation as this.

I leave them, however, to explain what the mental process was which prompted him to act as he did on hearing the command. He cast round for a few seconds in an excited manner, and soon found my trail, working so fast on it that I could not at first follow without repeatedly checking him. Those who are familiar with the Australian bush will appreciate the difficulty of working, now through the scrubs on soft,

damp earth, which never feels the sun, then across burnt patches of rocky soil, and anon among ferns which almost stop the passage of a man. Two or three times he was so much at fault that I had some misgivings, and nothing but my conviction that he was without doubt on the track, and of his staunchness in all his work, sustained my confidence in him. After the first command I spoke not a word to distract his mind, or interfere with the concentration of purpose he evinced. To watch such an honest and thorough piece of work was a greater pleasure than I have ever derived from sport; and when he at length picked up the flask from among the ferns, and triumphantly delivered it into my hand. I thought John Locke's self-sufficient depreciation of animal intelligence would have met with a severe rebuke, had the author of the "Essay concerning Human Understanding" stood beside me, and witnessed that dog's exultation in the successful performance of the difficult task set him-a task which from first to last must have been accompanied by full conciousness of the end to be attained, viz., that of finding some object associated with his master.

The powder flask will never again do duty in charging the old "Purdey;" but it hangs on the wall among other cherished mementoes of the past, each of which could tell some story, or has borne some part in adventures by flood and field, and serves to carry memory back to scenes whose interest was so greatly enhanced by the society of the dog.

A few days after my return to England a friend took me over his shooting to have a look at the coveys, among which we should be busy before long, and I gave him the above account of hunting on my back trail. He then proposed a trial immediately, though having, like myself, some doubts whether the dog might not be puzzled in highly-farmed country, so different from his native Australia, and swarming with ground game. Accordingly I rolled up my pocket hand-kerchief, tying it in a knot, unnoticed by the dog, and threw it into a ditch. We then separated a few yards, to prevent

the possibility of confusing him with two trails, walked across a piece of fallow land, then through a small covert, across a patch of turnips, round two sides of a field of standing corn, and passed through a corner of the latter on to some high ground in a meadow, whence the track could be seen at several points. My friend being greatly interested in the result of a trial altogether new to him, had imposed a somewhat severe, but not in any way unfair task on the dog, by taking a very irregular course, including one right angle, the whole distance being not less than half a mile by his computation, I sent the dog to seek, and he went off on the trail through the standing corn where we had passed, and at every point at which he was visible he was hunting with his nose down and on the trail. We saw him cross the fallow, returning with the handkerchief in his mouth, but after that he took a much more direct line, and must have crossed nearly the whole of the cornfield, coming out at a place a considerable distance from where he had entered, and made straight for our position.

During that and the following shooting season I was often requested to make this experiment, with never any approach to a failure, and as often offered very high prices for the dog. One young gentleman, conspicuously deficient in everything except wealth, would have paid an immense sum for him for the base purpose of betting on his performances; but, apart from the impossibility of separating myself from a friend to whose watchfulness I had probably more than once owed my life in Australia, the buyer could have acquired only his body. This young man's acquaintance with dogs had been derived from the show bench, where there was nothing to teach him that a dog may be very much more than a collection of "points" easily transferred from one owner to another without deterioration. Carlo I. would have done nothing of the kind described for anyone except myself, and he condescended only to do work on game for one or two intimate friends when he knew that I was not far off.

There is, indeed, no possibility of transferring the working qualities of a first-rate retriever, for they depend on the interest he takes in sport in association with the man who has shown him the way to employ his faculties in a pursuit which affords him pleasure.

The scent of anyone with whom a dog is familiar seems to linger for some time about a place, and even in the air, and there can be no question that the animal can thus identify a person whom he does not at the time see. Carlo I. became much attached to one of my sisters, who took care of him in my occasional absence from home for the day, but he made no friendships with other members of the family. This sister used to frequently go to my "den" to write her letters or consult a book while I was out for a walk with the dog. On returning I knew with certainty whether she had been into the room, for the dog would walk round, not with his nose down, wagging his tail with almost as much energy as if she were present.

During the year this must have happened repeatedly, and, on inquiry, he was always found to have been correct. On one occasion considerably more than an hour elapsed since she had entered the room, merely to place some letters on the table, and had remained but a minute or two, yet he indicated his knowledge of the fact in his accustomed manner. No demonstration of the kind ever took place after a visit from any other member of the family. It may be concluded. then, that associating this person with a sense of consolation and companionship, during my absence, those ideas were recalled to his mind and identified with her whenever he scented her, and he was impelled to express his pleasure. This "den" was situated in what had been a harness room at the back of the stable, through which it was necessary to pass to reach it, and shut off from the yard by three doors. Yet, on approaching the outer door, I was always certain if she happened to be in the room by his dancing round me and wagging his tail in anticipation of seeing her.

Not to weary the reader with more instances, which could be given, of this particular case, I will pass on to others of a a somewhat different character, but indicative of the same power of identification. The most recent occurred lately with Carlo II.

I was walking up Haverstock-hill, a good many people passing at the time, when the dog, a few yards in front of me, threw up his nose, sniffed the air, wagged his tail, then turned and ran past me round a corner a short distance behind. Following him, I found him making friends with a young lady who had passed me unnoticed, and with whose family we were on intimate terms. At the moment when first he became conscious of her presence he could not have seen her, as she would then have turned the corner. A few days subsequently I saw her mother approaching in Park-road, some thirty or forty yards away. The dog trotted past her without seeing her or making any sign, but long before we met I saw him turn, hesitate, sniff the air, wag his tail, and run back to greet her.

Looking over my notes, I find several more instances of this kind of recognition by scent of persons with whom the dog was well acquainted. There may be a doubt whether he identified them respectively as A., B., C., &c. (though there can be none in the case of my sister), but the expression of pleasure immediately on perceiving the scent points at least to the recognition of a friend by the sense of smell. I think there is a strong presumption that the association of ideas is in all cases carried as far as complete identification of the scent with a particular person, and the dog recalls the several ideas which go to make up the individuality as it is apprehended by his mind.

This should cause us no surprise when we reflect on the power of discrimination exhibited by a sporting dog. To the human olfactory sense a living or recently killed snipe or partridge gives no distinct odour, yet these birds possess, for the dog, so potent an odour, that with the wind in his

favour he perceives it at a distance of forty yards or more. Many sportsmen have told me, and I have seen it in my own dogs, that they can generally tell whether the pointer or setter is standing fur or feather, or even different kinds of winged game.

Some sportsmen are unobservant, or so much more concerned about the "bag" than interested in the movements of their dogs, to pay any attention to such matters, and are apt to regard this as a mere fancy. Every man I have met with, however, who has had the intelligence to train his own dog has remarked it. Carlo I. was quite familiar with snipe and quail in Australia, but his attitude on first finding a covey of partridges in England, was totally different. He almost lay down to the scent, and always did so subsequently.

When standing a hare his tail was carried very low, while he stood upright. On a pheasant in a hedge or ditch he stood like a pointer, while his manner on snipe might be described as "sneaking."

When a wounded pheasant falls in cover, this power of discrimination comes into play remarkably. The bird runs perhaps two hundred yards before it is picked up by the dog; in the meantime, hares, rabbits, and other pheasants have probably crossed its path, but the first-rate retriever—there are not too many of them, to be sure, but this is invariably the fault of the trainer or owner—sticks to that scent, and brings the bird to bag, possibly because the odour of a wounded bird losing blood may be different from that of an unwounded bird.

Everyone who is acquainted with the beach at Brighton, with its water-worn pebbles, will understand the difficulty of finding any particular stone, unless it differs very conspicuously from the others. By careful examination, we may often observe some slight peculiarity sufficient for identification which would not be perceived by the eye of a dog. I was accustomed, when walking on the beach with a friend, to pick up some stone having any slight recognisable mark

on it, and to carry it in my hand for a few minutes; then, asking the friend to hold the dog and cover his eyes, I would throw the stone fifty or sixty yards along the beach, and send him for it, merely waving my hand in the direction. He would then quarter the ground carefully, and very seldom failed to bring back the stone in few minutes. It is not too much to say that I have made this experiment hundreds of times with both Carlo I. and Carlo II., and among the small proportion of failures they never attempted to bring me any other stone in substitution for that I had thrown. The scent communicated by my hand was almost always sufficient to enable them to pick out that particular pebble from the tens of thousands of closely similar rounded flints lying about.

Those who are acquainted with the delightful suburh of Hampstead will also be familiar with Church Row, at the end of which stands the ivy-clad parish church. Some years ago, when living within a few steps of the pleasant churchyard, in which I have so often listened to the nightingale, I used to take Carlo I. out at night, pick up a stone, retain it a few seconds in my hand, and throw it over the wall among the tombstones. I then sent him for it; and he would jump the wall, hunt about, and usually retrieve it, though this could have been no easy matter on ground covered closely by graves, many of which were surrounded by low railings. Light could not possibly have aided him here in any way.

In Church Row, too, he helped me to train another retriever to find stones. My plan was first to send the older dog three or four times for the stone while holding the younger one by the collar, to let him understand what was wanted. Then, holding up the older dog, I would throw the stone, at first only a few yards, to encourage the beginner, gradually increasing the distance. Whenever the pupil seemed at all discouraged or disinclined to work perseveringly, letting the older dog go stimulated his faculties

and instructed him how to quarter the ground properly. In this way, half-a-dozen lessons made him tolerably expert. Stone hunting is very excellent practice for young dogs, and they become extraordinarily fond of the sport, because, I imagine, they are conscious of exercising their sense of smell to the utmost, and there is the frequent gratification, so dear to their hearts, of having done their duty well. Stones are better for the purpose than any other objects, having no odour proper to themselves. Whatever may attract the dog's eye, such as a stick or ball, or anything with which he is familiar, should be avoided, at least in training, for it is desired to teach him entire dependence on his nose. which begets such implicit confidence that he will work for an indefinite time rather than give up the quest; whereas he soon becomes discouraged if he has acquired the bad habit of using his sight and is immediately successful, while in the dark he can then do nothing. For this reason the learner should be taught at night, when his eyes can give him no help.

My three retrievers, the two Carlos and Hector, were accomplished stone hunters, and on every fine night I indulged them in their favourite pastime. On a freshly macadamised road I would frequently take up one of the pieces of angular granite, rub off a corner on the kerbstone as a means of identification, and throw it to a distance among the others. The only indication of its whereabouts the dog could have, was the sound of its fall, yet failure to retrieve it was the rarest occurrence. Between two dogs equally expert it is interesting to watch the eager emulation displayed in the effort to be first to detect the whereabouts of the stone.

Constant practice is of great advantage to a sporting dog. It cultivates his sense of smell, trains him to perseverance, steadies him for his work in the field, and, by no means the least consideration, gives him an immense amount of innocent enjoyment and affords healthy employment for his

mind. It is, perhaps, unnecessary to remark that in selecting a stone care should be taken to avoid any of so small a size as might accidentally be swallowed; while the practice of encouraging a dog to carry bricks or very large stones, to the possible injury of his teeth, is almost too obviously stupid to need condemnation.

I have one more instance of the power of discrimination to give. One very dark sultry night in the summer of 1881, a party of ladies and gentlemen were sitting out on the lawn of a country house in Kent, where I was a guest, discussing the subject of animal intelligence. My Australian fellow sportsman, Mr. E. H. Pringle, who had then just returned from India to enjoy a few months' rest after his arduous labours in organising relief for the famine-stricken natives of the Madras Presidency, asked, "Do you think Carlo II. has as fine a nose as his grandfather, whom we used to shoot over in Queensland? I shall never forget his finding that wounded ibis in the ti-tree swamp when you joined me after I had been beating about for it for a quarter of an hour, and at such a distance from the place where it fell." "He has not yet had any great experience of game," I replied, "but I have no doubt of it. However, let us try him."

I then sent one of the boys into the house to shut up the dog and bring me a cricket ball, which, after retaining it a few moments in my hand, I threw as far as possible into a thick clump of rhododendron bushes. The dog was now let out of the house and given the command to search. He could not possibly know what object he was required to find, neither had he any idea of the direction in which to seek. In the stillness of the night we could hear that short explosive sound of the air escaping from the lungs after a long inhalation, betokening the eagerness of his quest as he rapidly quartered the ground all around us, and presently moved further away. Everyone except my Australian friend was confident that he would not find it on so dark a night, and I was offered bets of three to one that

he would not do it if he worked for an hour. To this I replied that I was not in the habit of betting on that which I considered a certainty. Within three minutes he placed the ball in my hand.

"Oh!" remarked one sceptical gentleman, "of course, the boys leave the balls about when they have done playing, and he might easily have picked up the first he came to." The boys stoutly denied this impeachment, and brought out all the balls in their possession, two somewhat the worse for wear, besides that I had made use of. To clear up any doubts, I marked them all with different scratches, and had the dog taken into the house again. Giving two balls to members of the party, who threw them in different directions, I myself threw that which I had first used, and the three would then probably be lying twenty or thirty yards apart among the shrubberies. Again the dog was brought out and sent leather hunting, and I noticed less disposition to bet three to one against the dog, while evens were freely offered by some. In about the same time as before he brought one of the balls, laid it in my hand, and flung himself down as though he thought he had done quite enough to vindicate his character, amidst well deserved applause. On examination, the ball turned out to be that which I had myself thrown. Possibly this may have been accidental, but one can readily understand that he may have hunted for my scent alone, neglecting the other balls if he happened to meet with them.

As a thunderstorm appeared to be brewing, the boys were anxious to get the other balls, and I was asked whether the dog could do it. I had some doubt myself, but the gentleman who was at first so sceptical, thinking he had a good thing, offered two to one on the dog—without any takers. His confidence was quite justified, for in a few minutes both the remaining balls had been brought to hand. "Bravo!" exclaimed Mr. Pringle, "that is as good a performance as his grandfather's in finding my wounded ibis; Carlo II.

is a true and worthy chip of the old block!" Carlo fared well at supper that night, and I could undertake to name one gentleman present who would have been only too proud to have been "within measurable distance" of the caresses bestowed by a certain charming young lady on that highly-favoured dog.

In a lecture delivered by Dr. John Rae at the London Institution in 1884, on Arctic Exploration, he described a remarkable instance of the value of the Eskimo dog to his master by the exercise of his keen scent in circumstances which must be most unfavourable. The arctic seals have a number of breathing holes in the ice, which they visit at short intervals. These holes are made while the ice is quite thin and kept open by constant use. As the ice thickens, the snow accumulates above them and completely obliterates all trace of them to the eye, a hole in the snow scarcely larger than a threepenny piece being the only communication the animal beneath has with the air. When it wants to breathe, the seal comes up and places its nostrils against the opening in the ice, when its warm breath thaws any slight accumulation of snow that may have fallen since its last visit.

If the Eskimo knows of one of these holes, he approaches stealthily, poises his spear or harpoon directly over the spot, and drives it straight into the seal's brain, after which the quarry is secured by cutting away the ice above it. The Eskimo dog is continually on the search for these breathing places, and on finding one, stands like a terrier at a rabbit's hole if the seal is "at home," and attracts his master to the spot. Thinking that possibly the dog was guided in his discovery by some slight gurgling of water, or the sound of the seal's breathing—as one may often hear the air emitted from the lungs with a kind of snort by seals in captivity on rising to the surface—I asked Dr. Rae what his opinion was, and he answered that he had never heard the seals emit any sound at their breathing holes, and believed the dog discovered them solely by his sense of smell.

I propose now to give a few miscellaneous notes on some wild and domesticated species of dogs, disclaiming, howeverany pretence of treating them from a fancier's point of view. For that the reader must go to such complete works as Mr. Hugh Dalziel's "British Dogs." The British wolf-once the pest of this country-has long since (about 1680) been "wiped out" in the interests of the farmer, and there are not wanting those who would rejoice to see our only remaining indigenous species, the fox, follow his larger congener to extinction. But, so long as the hunting instinct survives in the breast of the true Briton, Reynard will continue to be cherished for the purpose of that sport which some enthusiastic Nimrods declare he enjoys as much as the huntsmen and hounds themselves! It is difficult to take this view when one calls to mind Landseer's picture of the fox lying stiffening to death after a long run, when his cunning has just saved him from being broken up-only to perish of exhaustion.

Wagging the tail seems to be a mode of expression of satisfaction peculiar to the dog, and by no means restricted to the domesticated animal. Some few years ago the question was seriously debated in the Field, whether wild canidæ had this habit, and it was answered conclusively in the affirmative. One correspondent mentioned the capture of three fox cubs in an earth, which he carried home, and, he continues, "they were then, I should say, about eight or nine days old, as their eyes were not open. They were fed with milk out of a bottle several times a day, and soon got perfectly tame, following us about like puppies as soon as they could run. They are now in a wire inclosure, with an artificial earth in it, and the difficulty seems to be to get them wild enough to turn out. Whenever my wife or myself go near them, they show all the pleasure a dog would, jumping about and wagging their brushes. They know a stranger in a moment, and at once run into the earth."

"Moorman" also says: "I can confirm the statement made by Mr. B. St. A. Jenner that foxes wag their brushes. At least, I have had three in confinement which did so. One was taken when quite a little thing, and reared by hand; when full grown he was quite tame, and, whenever I paid him a visit in his kennel, would come to the full tether of his chain, and, lying close to the ground, wag his brush in a very decided fashion; but when loose he very rarely did this. The other two were both taken when about half grown, and became fairly tame. They both used to wag their tails when the food appeared in the morning. I have often had opportunities of watching foxes (wild) on the hunt and at play; but the only time I remember to have noticed this feature in their movements was when watching a fox winding out a rabbit across a pasture field."

A fine specimen of the American prairie wolf (Canis latrans), from the Rocky Mountains, lodged among the small carnivora at the Zoological Gardens, and named "Mee-Mee," indicates her pleasure by wagging her brush vigorously on being spoken to by name. All the dingoes I have seen, both at the Gardens, at Mr. W. K. Taunton's Kennels, and elsewhere, evinced the habit more or less distinctly. It is not, then, purely an acquisition of the domestic dog, for "Moorman" saw it in a wild fox which had never been under human influence. Still, it differs markedly from the same action in our dogs, being a timorous swinging of the tail at a low level, rather than that strong waving of the "flag" at or above the line of the back, with which our canine friends greet us, and show their delight at a word of commendation; and it is entirely deficient in those nice gradations expressive of many moods and conditions of the mental state.

The change in the voice is one of the most marked characters of domestication. So far as I can ascertain, all genuine wild species hunt silently, whether singly or in packs, as would appear to be necessary in order to avoid

warning the quarry, with the exception of an occasional yelp by a jackal. In what contrast to this is the loud clamour of a pack of hounds, so vividly described by Scott:—

The deep-mouthed bloodhound's heavy bay Resounded up the rocky way,
And, faint, from further distance borne,
Were heard the clanging hoof and horn.
Yelled on the view the opening pack,
Rock, cliff, and cavern paid them back;
To many a mingled sound at once
The awakened mountain gave response.

What sympathetic ear that has ever heard it could fail to be charmed by the merry minstrelsy of a pack of beagles or harriers racing along on a hot scent? Some of the voices are quite flutelike in tone, and how finely they are graduated, from the inquiring whimper over a doubtful scent to the full, rich cry of assurance! Thus, under domestication the dog has lost his instincts of caution, and noisily proclaims his eagerness, whether in company or alone. Much to my astonishment once, on suddenly springing a kangaroo, Carlo I. forgot his sedate manners and raced off out of sight in full cry, though he had not the remotest chance of ever coming up with it, stimulated, no doubt, to this breach of discipline by having had no food but roast duck for two days previously.

The acquisition of the "watchdog's honest bark" must have been of the greatest service to pastoral man in early times, but it is of far less importance now, and cannot be considered an unmixed blessing. For instance, when it goes on all night long, excited by the multitudinous sounds of modern civilisation, or by that cat who sits on a wall in the moonlight enjoying the impotent struggles of her enemy to break his chain. Some dogs have no discrimination whatever in this matter, and are quite worthless as watchdogs. But in many cases their restlessness is due to the stupidity or inhumanity of their masters. Their kennels are cold or

wet, or their stomachs empty, or, more probably, they have had no exercise during the day. The man who keeps a dog for the protection of his property, and neglects to give him at least an hour's good exercise every day, ought to be fined on each occasion for his inhumanity to an animal of such active habits and excitable temperament.

There ought, too, to be a more prompt method of restraining the offending owner from inflicting the barking torture on his neighbours than is now obtainable by the ordinary process of summons before a magistrate.

The nuisance is practically beyond remedy; the consequence is obvious—attempts are made to poison the dog. If he cannot be reached without detection in his yard, the bait is laid in the street, in the hope of catching him, regardless of the probability of destroying others. A person occupying the position of a gentleman, and in all things a good citizen, told me that, as he could obtain no practical remedy for the nuisance which seriously affected his health, he was determined to destroy the dog, and that he was then scattering poison broadcast in the streets. I remonstrated in vain, and I believe he was eventually successful in three cases. I am as certain as it is possible to be in the circumstances, that two valuable St. Bernards and one retriever fell victims to the annoyance inflicted on a neighbour by the perpetual barking of another dog which he endeavoured to poison.

Owners and exhibitors, then, who value their dogs—not only for their worth in money—should support one another strenuously in combating the common enemy—one who keeps a barking dog—as well from the selfish motive of protecting their own animals, as in the general interest, by suppressing a public nuisance. The offender himself is always impervious to any kind of appeal whatever, as such a person would be likely to be. Either he does not live on the premises, or he is endowed with the nervous organisation of a hippopotamus, and brutally insensible to the noise. Remonstrance is generally met with insult, always with indiffe-

rence. It is difficult to get neighbours, themselves suffering from the affliction, to come forward and prove the nuisance. No magistrate will listen to a complaint from one individual, or, at least, will utter some mild reproof, of which no notice whatever is taken.

There is scarcely any part of suburban London where this nuisance is not rampant, and a source of serious distress to brain workers, and of imminent danger to the sick. I had the misfortune some years ago to endure this kind of torture for two months, before it was possible to find out the owner, though the dog was kennelled not a hundred yards from my dwelling, owing to the irregular arrangement of the houses round a kind of "square," with a private road ending in a cul de sac. He (the dog) was a half-bred Newfoundland with a tremendous voice, and had been brought to live near me soon after I had settled in my then abode. Having the curiosity to devote an hour to counting, I found that, in that time, he barked more than 300 times, and that was quite an average specimen of his capability of inflicting torture, which continued with scarcely any intermission, day It was probably the only kind of exercise the and night. poor creature ever had, for he was never seen in the streets.

For some reason, the immediate locality was infested by dogs. I identified twenty-one large and small individuals, living within a radius of less than 150yds. of my afflicted ear, so that the chance of a single hour passing without a chorus started by one or other of these, was small indeed. Matters were complicated by the presence of seventeen cats (I counted so many sitting on the wall and roofs), plus two dogs, in the possession of a person of the female sex close at hand. The cats in their nocturnal peregrinations looked defiance to the dogs from the vantage ground of the walls, and then—

At once arose so wild a yell, As all the fiends from Heaven that fell Had pealed the banner-cry of Hell, and high above the general din could be heard the stentorian voice of the half-bred Newfoundland. A grateful country should feel indebted to me for having got out of that as soon as possible and saved it the expense of supporting one more incurable lunatic.

The burden of combating these intolerable nuisances should not be borne by private individuals. They ought to be ordinary matters of police, to be inquired into on a well-founded complaint; and a prosecution should be undertaken, if necessary, by a public officer, who would easily obtain evidence where a private individual is unable to secure it for any action he may desire to take. A house-to-house visit of inquiry in the neighbourhood by such officer, would place him in possession of overwhelming confirmation of any genuine complaint, and he could go to a magistrate for an order cautioning the offender to abate it forthwith, on pain of prosecution and fine.

There is no need to urge on the humane and conscientious owner his duty to his dog as well as to his neighbour, for one includes the other. He will see that to keep a dog chained up during the greater part of its life, is to inflict upon it perpetual misery. If all those unfortunate dogs that are on the chain from day to day and month to month could express their feelings, I am sure they would prefer almost any other form of cruelty, so long as they could enjoy their liberty, to the wretched life of inactivity they are forced to lead, staring all day long at four blank walls and a stable broom. What criminal would not choose hard labour in the open air rather than solitary confinement in a prison We must consider the high nervous organisation we are dealing with. This becomes more or less deranged, the dog is rendered uncertain in temper and stupid from want of association with man, and he suffers agonies of mind in waiting, watching, hoping for the freedom that never comes. We can shut up a cow in a London dairy from the day on which she gives her first pail of milk to that on which her

aged carcase is handed over to the cat's-meat man, and she goes on chewing the cud of contentment year after year with infinite satisfaction to herself and much profit to her owner. But the poor dog, chained up in a back yard, and taught to regard humanity as something to be furiously assaulted on every occasion—to him the heavens become as brass and the earth as iron, and he goes to his grave without ever experiencing that supreme pleasure in which his free brethren rejoice daily—the society, love, and friendship of man.

That wild dogs may learn to bark, is unquestionable. Both the dingoes in the Zoological Gardens did so within a short time of their arrival—the keeper told me, from hearing the Eskimo dogs in the next kennel. I doubt, however, whether these were true-bred animals. They looked as if they had a Newfoundland strain in them. Dr. Rae tells me he never heard an Eskimo dog bark or "give tongue" on a trail; and Mr. Taunton, at whose kennels I saw "Sir John Franklin" a typical Eskimo dog, brought home by the "Pandora" expedition, assured me that this specimen never barked, though a litter of true-bred pups, sired by "Sir John," all learned to do so. Neither of Mr. Taunton's dingoes, "Lupus" and "Captain Burton," the latter imported direct from Australia, and as noble a specimen as I ever saw, dead or alive, among hundreds, was ever heard to bark. The bark of the dingo, as I have heard it in the Gardens, was a short sharp sound, very different from that of any domestic dog of the same size.

From these facts it may be inferred that the habit of barking may have been acquired by wild dogs in the first, or at least second, generation after their translation from the feral to the domestic condition; while that of "giving" tongue on a scent, implying as it does the suppression of the necessary instinct of silent caution, probably took much longer to develop, and it may have been induced by the shouts of the huntsmen cheering the dogs on to the chase.

The habit of barking may occasionally be lost, as with some dogs left on the island of Juan Fernandez, whose descendants, thirty years afterwards, had entirely ceased to bark; a few of these, taken into domestication after that period, acquired the long-suppressed habit.

The dingo (on which, as an interesting feral or semi-feral species, inhabiting a region dominated by the Marsupial order, it may be permitted to make some observations) breeds pretty freely in captivity. This has taken place twice or more from one pair in the Gardens: the mother ate the whole of the first litter. Of the second, one which I saw and handled was very irregularly marked black and white, though both parents were true bred and brought direct from Australia; and at that time it had drop ears. It could not, I think, have escaped my attention if any of the pups I have seen in Australia had been at all similar to this in the colour and ears. However, Mr. Taunton, who possessed it subsequently, informs me that it grew up in all respects normal as to the colour, and its ears became erect.

It is yet uncertain whether the dingo is an indigenous species, not introduced by man; or whether it was introduced by that immigrant race from the north-west, which is now believed to have populated Australia and Tasmania; or whether it is the descendant of domestic species imported by the early European navigators. The existence of this (palæontologically modern) placental mammal in the midst of a region usurped by a palæontologically ancient order of implacental mammals, is some presumptive evidence against its pre-human indigenous origin, and, thus far, no species of canis or other placental animal has been found associated with the abundant remains of fossil implacenta in the recent strata hitherto explored. This negative evidence, however, must not be accepted as conclusive when paleontology presents so many examples of survivals. Thus, the dingo may represent the last remnant of the Australian placental fauna. Its introduction by some immigrant race of man is likely to

remain for ever an open question. It is scarcely credible that, had any domesticated species been imported by the navigators and gone wild, it could have so rapidly overspread the vast country, and have reverted in a period of about a century so completely to the feral type which the dingo now presents. Within the influence of civilisation chance alliances have taken place with the dogs of the settlers; but in the back bush no more thoroughly wolf-like creature could be found anywhere. One may often see pure-bred dingoes, originally taken as pups, in the camps of the natives; but these improvident savages pay so little attention to anything, that they have not raised a permanent domestic race from the wild animal. Its ravages among sheep, which it will even kill for amusement, are notorious. Kangaroos may have been good, but the dingoes preferred mutton as soon as it was presented to their notice. I recollect that about a hundred sheep had been cut off from a flock, and jammed by the dingoes against the bank of a deep creek, where the dogs amused themselves by biting through the hind legs of the miserable sheep and tearing the flesh from their flanks. When we found them, about two hours after the shepherd had lost them, some presented a shocking sight, their hindquarters being literally stripped. Half of them were more or less injured, many fatally, and many were dead. All this havor had been wrought, the shepherd believes, by not more than three dingoes, for he saw no more run into the flock. They will occasionally tackle calves and foals, but have never been known, in any circumstances, to attack man.

I have seen them at times come stealthily towards the camp fire, sniffing the remains of food, but the bushmen in that case do not hesitate to turn over and go to sleep in perfect security. At a station on the Macintyre river they were very numerous, so that the shepherds were perpetually engaged in poisoning them with strychnia. One dark sultry night several were howling around the house at the head station. Nothing annoyed "Jack" (our little black and tan

terrier) like the mournful cadence of their voices, and he kept dashing out into the darkness, barking furiously, and again returning to the verandah when the enemy had retreated for a space. Suddenly, during one of these raids, "Jack's" voice ceased, he did not return, and nothing more was ever seen of the plucky little fellow. There cannot be a doubt that he found a grave inside the stomach of a dingo.

The Eskimo dog so closely resembles the great Arctic wolf that its derivation from that species is indubitable. Without these animals to draw his sledge and help in procuring food, life would be impossible to the Eskimo of the Arctic regions; and in proportion as he possesses a large or small team he takes his position in Greenland or Alaskan society. Should the animal become extinct, he will certainly follow it. The emigrations which took place in Dr. Rae's view from West to East could not have been performed without the dog. As a last resource, and occasionally by way of luxury, the Greenlander eats his dog, while the latter is kept in such a state of semi-starvation that he is fain to turn the tables on his master if not held in the strictest subjection by severe treatment. Dr. Hayes, on returning to the hut one day, was set upon by the whole team of thirteen hungry dogs, and, but for the fortunate circumstance of finding the driver's whip lying at hand, would assuredly have been devoured, as has happened to many an Eskimo. Nothing comes amiss to them; the harness will all disappear during the night if it is left out in their company. will, it is said, endeavour to snap off a man's hand if he thoughtlessly removes his glove.

Dr. Bessels describes how one day on board the "Polaris" the porcelain handle, with its usual iron rod, fell off one of the cabin doors, and five or six of the dogs made a rush at it. A momentary struggle ensued, the door handle was swallowed, but neither it nor the dog proved any the worse. These hardy fellows curl themselves up and go to sleep on the ice when the thermometer is far below zero. Huxley

it is, I think, who attributes the habit, noticeable in the domestic dog, of turning round several times before lying down, to a survival of the instinct of his wild ancestor in thus trampling the grass to form a bed. Dr. Bessels never saw an Eskimo dog do this, which tends to confirm the explanation given; for, during the greater part of the year the Arctic ancestor of this dog would find no grass to trample.

The sledge driver often has a lively time with his team -as when they all start off in hot chase of a reindeer or hare, or when a free fight takes place, and harness, men, sledge, and dogs become mingled in inextricable confusion. In some parts of the Arctic regions, they are driven with the whip; in others, the driver throws out a piece of wood attached to a thong on the side from which they are to turn. A pilot dog is sometimes sent on ahead to lead the way over thin or treacherous ice, and the team follow him implicitly. Their intelligence is shown by their spreading out when they come to dangerous places, in order to distribute their weight. Dr. Bessels, finding it impossible once to urge his team along with the whip over some yielding snow, sent a man ahead trailing a red herring by a string, and the eagerness of the dogs to get at the prize enabled him to make good progress. The life of these wretched creatures is an endless struggle with perpetual hunger and illtreatment. Their masters cannot afford to feed them, and there is no appeal except to the whip. Some tribes, like the Alaskans, have no regular driving cries, but endeavour to manage the team by a storm of various oaths, uttered promiscuously just as they come to mouth.

Few, it may be supposed, will hesitate to place the St. Bernard in the highest rank among dogs, for size, beauty, and intelligence, in which he has, perhaps, no competitor, except the Newfoundland. The St. Bernard first appears in history with the foundation (in A.D. 962) of the famous Monastery on the Alps; but what his origin was, it would be

vain now to inquire. The breed, however, probably can claim a very ancient lineage, for it differs so greatly from any lupine type. It may, confined as it is to the Alpine region, be a direct descendant of the dogs with which the builders of the lake habitations guarded their flocks and herds; for so powerful an animal must, at one time, have performed duties of a more belligerent character than those assigned to him by the kindly monks.

Naturally, perhaps, a good deal of harmless superstition has gathered around these fine animals. The monks think very highly of the white line running up the face, meeting a white band round the neck, simulating, in a rough way, the badge of their order—the piece of lace worn round their own necks, extending down the back, to the waist, and round the body. These dogs often possess, in an exaggerated degree, that peculiarly ugly, useless, and troublesome appendage, the supplementary hind toe, the representative of the suppressed great toe, called the "dew-claw," which may even be double. This appears occasionally in every breed, though, I believe, it is never seen in wild species. Why it should be deemed a beauty and an essential "point," one cannot understand. except on the principle that fanciers are apt to disregard natural history in the arbitrary standards of perfection they set up and straightway proceed to bow down to. in a letter, dated 1867, from Etienne Metroz, C.R., of the Hospice of Great St. Bernard, the monk says: "As to the dew-claws, we are convinced that if one meets a dog bearing the name of a St. Bernard without having double dew-claws -we are convinced, I assert, that one of its ancestors was not of the true race."

This may pass as a matter of taste; but when we are gravely told that the dew-claw is a distinct evidence of purity of breed, because it is of so much use to the dog in supporting him on the snow over which he travels, anyone possessed of the most elementary acquaintance with anatomy must smile. In answer to a question addressed to

him on the subject by Mr. Hugh Dalziel, the late Charles Darwin rightly characterised dew claws as "accidental monstrosities." They are, in fact, simply appearances under domestication of a suppressed or never developed digit (the great toe), the corresponding digit (the thumb) being invariably present on the fore limb, and articulated with the carpus. Dew claws, having no bony attachment to the tarsometatarsus, and presenting so small a surface, cannot possibly bear any of the weight of a heavy dog, or prevent him from sinking in the snow.

With most of us the very name of the St. Bernard is suggestive of benevolence, and aid to the lost or weary traveller. From time immemorial these dogs have been credited with displaying the utmost sagacity and interest in their work of rescuing travellers passing over the Alps, when the road has become obliterated by a snowfall, or they have failed to reach the Hospice before night. Railways have now practically abolished the pass of St. Bernard, and there is no longer any real need for the services of these dogs, of whom such extraordinary stories have been told. No lover of the dog will doubt any of these accounts without extreme reluctance; but when we find one authority assuring us that Barry, who died in 1815, had saved more than seventy-five lives during the fifteen years of his existence, and another asserting that the number did not much exceed the half of that, we are disposed to be somewhat sceptical.

In her delightful book on "Village Life in Switzerland," published in 1865, Mrs. S. D. Delmard deals a sad blow to the romance of my childhood in the following account of these dogs, written on the spot. Referring to the popular pictures which we all recollect so well, she says: "These pictures usually represent a dog of colossal proportions, standing with one foot on the breast of a traveller, who lies insensible and half covered with snow, close to some tall pines, of which many more are to be seen higher up on the road leading to the Hospice, from which one sees

sequently to the *Pall Mall Gazette* one of the most amusing articles imaginable from the "disappointed exhibitor's" point of view, and a model of the temper in which adverse awards should be received, for Chang was scarcely looked at.

Chang possessed the black muzzle, then considered enough to put any dog out of court, though he rejoiced in the full development of those useless and unsightly appendages—dew-claws; but, unfortunately, they were only single! Nevertheless, I heard a celebrated exhibitor and breeder of St. Bernards, and one equally celebrated as a judge, tell Chang's master that, had he himself been judging on that occasion, he should not only have awarded him the first prize as a St. Bernard, but considered him altogether the best dog in the show. Puppy as he was—about ten months old—he was bigger than any adult dog in the place, grand in coat, and finely proportioned, but, unfortunately for him, muzzles were worn white then.

His master walked home with him next day, determined never again to subject him to another night of the misery he had evidently undergone in that short experience of public life. In this I must confess myself completely in sympathy with Mr. du Maurier, for, had I the finest dog in the world, I would rather return to the Australian bush, and earn £40 a year as a shepherd, in daily peril from the spear of the savage, with the dog beside me, than allow my friend and companion to run the risk of being murdered by the cowardly assassin, always lurking about a dog show, in the pay of some disappointed exhibitor.

His formidable appearance, however, always inspired respect. Late one evening, his master was crossing a lonely part of Hampstead Heath, accompanied, as usual, by the dog, when he encountered two men whose intentions there was every reason to suspect. Stepping hastily out of the pathway, one of the roughs remarked in a gruff tone, "Ble'st if a cove didn't ought to get six months for keepin' a dawg like that."

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MR. GEORGE B. DU MAURIER'S ST. BERNARD, "CHANG."



The admirable drawing, by the late Mr. T. W. Wood. well expresses the leonine aspect of this noble specimen. His manners in the house were perfect, and his temper unruffled by the utmost strain the children could put upon his good nature. As he lay on the floor of his master's studio, they would roll about on his great tawny body to their hearts' content; but Chang never resented any interference on their part with his convenience or dignity. Shortly before Chang's death, which resulted from a complication of heart disease, inflammation of the lungs, and dropsy, his master wrote to me: "I don't think anyone ever got more pleasure out of an animal than I have out of Chang. His beauty is always fresh to me, and he has always been so constant a companion. . . . An incident occurred the other day which will interest you. He recollects things well, and sometimes broods over them. night I came home late from the Punch dinner, and, letting myself in, found Chang more demonstrative than usual in the hall, and with apparently something on his mind. I went into my studio, and sat down on his bench in the bow window, reading a paper, and Chang got up, put his head on my knees, and went to sleep. Presently, my wife came down from the nursery, and began, 'Such an unfortunate thing! Chang and May'" (his youngest daughter) "'were playing together, and he rolled down the hill with her, and hurt her knee.' As soon as Chang heard May's name, he sat up, and began to paw me in an apparent agony of remorse and anxiety. I had the greatest trouble in soothing him, and he had evidently been thinking of nothing else but the accident."

The bulldog has been termed by Youatt a "stupid and ferocious brute," a designation which might have been justly applied to him in olden times, when his life was passed in bull baiting and fighting, and he was the favourite of blackguards of high and low degree; but it is certainly a libel on his modern representative. A short time ago, I visited the

kennels of Mr. B. W. Donkin, and, though quite a stranger to them, handled some dozen bulldogs, of all ages and both sexes, with perfect impunity. Mr. Donkin considers them second to no breed of dogs in good temper and manners, and intelligent when treated as companions; but not in respect to mental capacity equal to colleys, retrievers, poodles, Scotch terriers, &c. This is not surprising, since they have not the advantage of inheriting the effects of long continued association with man, like many other breeds.

Mr. Donkin informs me that his champion Byron, the subject of this illustration, will not only track his footsteps, but has been broken to the gun, and will find and retrieve fur and feather, both by land and water. The remarkable prognathism of the lower jaw, which occasionally appears in a modified degree in other breeds, is, of course, the result of selection—a deformation, by the way, which would place a dog that had to hunt for his living at the greatest disadvantage. This peculiarity was at one time highly valued, because it was said, accompanied as it is by nostrils set far back, that it enabled the dog to breathe freely while hanging on to the nose of a bull; however this may be, this character, as well as the shortness of face, has become much exaggerated during the past hundred years. It is somewhat singular that so great a degree of modification should have taken place in a direction the very opposite of that which is serviceable to the animal. The bulldog cannot take hold quickly with his mouth, and in hunting he is obliged—the nostrils being set so far back-to bring his nose almost under his chest, with the risk of falling forwards. These disadvantages are, to my thinking, conclusive against the supposition that this breed, if no other, is descended from a wild species with similar characters; for, exactly in proportion as these structural disadvantages exist, the animal would be impeded in hunting and securing his prey.



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MR. B. W. DONKIN'S BULLDOG, "BYRON."



CHAPTER V.

Rabies—Summary of the Present Condition of Knowledge with Respect to its Genesis, Symptoms, and Results—Immunity from the Disease of the Australasian Colonies and Réunion—Singular Cases—Reputed "Hydrophobia" in Human Subjects—Spontaneous Recovery of Man and Animals—Pasteur's Investigations—Nostrums and Empirical Treatment—The Dogs' Home.

Notwithstanding all we owe to the dog, both as our friend and our servant, he is, unfortunately, liable to become our deadly enemy, by reason of the communication to us, by his bite, of a malady resulting from the virus contained in his saliva when suffering from rabies, or canine madness. This is attributable, in great measure, to our own ignorance, indifference, and neglect; for a purely contagious disease ought to be almost entirely under control. During the past ten years—from 1874 to 1884—it has become more prevalent, with the largely increased number of dogs bred for fancy purposes, and kept for competition at shows and by the public generally.

A brief summary of the present state of knowledge with respect to the *genesis*, symptoms, and effects of this disease, may be acceptable to the reader, and will not be considered out of place in a book on the carnivora, since all the families may be affected by it, and, on account of their habit of using their teeth in attack and defence, they are especially likely to communicate it to man and other animals. Although, on this account, the carnivora are more frequently the subjects and bearers of the disease, it can probably be communicated from any mammal to any other, and thence to man. It is certain that it can be communicated, both by the natural bite and by inoculation, to the horse, ass, ox, rabbit, rat, guinea pig, as well as to every species of canis, wild or domesticated; and some of these are known to be able to transmit it to man as well as to other animals.

Until a very few years ago, it was believed that rabies might, and often did, originate in the subject owing to pathological changes in the blood or the cerebral matter itself, due perhaps to starvation, want of water, excessive heat or cold, long continued confinement, ill-treatment, or other causes disposing to constitutional disturbance. Experiments, however, conducted with the utmost care by foreign physiologists, and extending over a large field and a protracted period, failed to show generation of the disease in any case. It may, then, be almost certainly concluded to be rarely, if ever, of spontaneous origin. Thus there is hope of extinguishing it altogether, or reducing it to a minimum, if, as is now generally conceded by the best veterinary authorities, the malady can be communicated only by the bite of a rabid animal. The presumption in favour of communication solely by this means, is immensely strengthened by the following facts.

Rabies is known to have been imported into the island of Mauritius in 1813, and has ever since been prevalent there, no restrictions on the importation of European and other dogs having been at any time adopted. On the contrary, it has never been recorded in the neighbouring island of Réunion, where strict measures prohibitory of importation have for long been enforced. The disease has never made its appearance in Australia, Tasmania, or New Zealand, though thousands of dogs have, from time to time, been imported into

those colonies. This may be attributed to the length of the voyage, which we may take to be, at the minimum, six weeks, and occasionally three or four months—affording time for the development of the malady in any dog carrying the seeds of it on board with him, and manifesting it there, when he would be destroyed.

. Still, these colonies must be considered fortunate in escaping, when we reflect on the prolonged period of latency or incubation, possibly a year, that seems, occasionally at least, to attend this scourge. In Australia, dogs are subjected to intense heat and deprivation of water, and their diet is almost entirely of flesh; but neither these nor any other conditions which may be supposed to be unfavourable to them, have yet originated the disease. The cases of Australasia, then, and of Réunion, afford as conclusive evidence as we could obtain, that the disease has not a spontaneous origin, otherwise it would be quite incomprehensible that it should not have appeared during the period-now approaching a century—of occupation by Europeans and their dogs. colonial legislature having become so fully convinced-after consulting Dr. Burdon Sanderson and Dr. George Fleming, F.R.C.V.S.—that the disease can find its way to their shores only through an infected dog from without, have now totally prohibited the importation of dogs from all parts of the world.

The following notice, issued by the authorities of the Brown Animal Sanitary Institution, Wandsworth-road, London (under the government of the University of London), conveniently sums up the symptoms of rabies:—"This disease occurs in dogs of all ages, and may appear at any season of the year. It is recognised by a change of demeanour of the dog, who becomes dejected, morose, inclined to roam, and anxious to hide himself. The animal gnaws at wood, stones, and any refuse which it sees, snaps at imaginary objects, and becomes unusually excited by strange or sudden noises. It rubs its throat with its paws, as if striving to get

rid of some object lodged there; at the same time, there is a more or less abundant flow of saliva from the mouth. The animal is, moreover, very readily excited, and barks with a peculiar harsh, strange cough. The dog will attack its master, or animals of any kind, and is most easily roused to fury by the presence of other dogs. It is feared and shunned by healthy dogs, not only when it attacks them, but when the disease is in a very early stage. There is throughout the disease no dread of water. Before the tendency to bite shows itself, the animal may be unusually affectionate to its master, licking his face, and fawning upon him. In one form of the disease, called 'dumb madness' there is paralysis of the jaw, and consequent inability to bite.

"Precautions in case of supposed madness: If a dog has shown any of the symptoms of madness mentioned above, or an unusual tendency to bite other animals, it should be at once loose-muzzled and chained up; but it is advisable that it should not be destroyed until it has been examined by some authority capable of determining whether it be rabid or not. Owners of dogs are warned of the danger they may incur by allowing their hands and faces (especially if scratched) to be licked by the animals, even if these show no sign of madness. All dog bites should be immediately cleansed by suction and washing, and the wounds cauterised as soon as possible.—Charles S. Roy, M.D., Professor, Superintendent." (See remarks on suction subsequently.)

The change in the dog's voice is well described in the following lines from "The Witches' Frolic":

It is not a bark, loud, open, and free, As an honest old watchdog's bark should be: It is not a yelp; it is not a growl, But something between a whine and a howl.

A very characteristic symptom, occurring in a large proportion of rabid dogs, is the dropping of the lower jaw.

The animal often wags its tail in answer to soothing words immediately before or after a dangerous paroxysm of mania. It will usually drink greedily—even its own urine—until the condition of inflammation renders the effort painful, when the sight of fluid may bring on a violent spasm or convulsion. Hence the term "hydrophobia" is misleading in most cases; and even an excessive desire to drink should raise no presumption of security. Neither is the presence of the viscid saliva at all a constant symptom.

The aspect of a mad dog, wandering in melancholy mood through the streets, in a steady jog trot, with hanging jaw, has been described by Youatt. He is not usually disposed to go out of his way to attack, but will bite dogs or other animals, or even inanimate objects, such as posts or vehicles, met with on the way. It is generally a sudden snap, and the sufferer passes on his way. Deliberate onslaughts have occasionally occurred, though rarely. Such a dog should be quietly avoided—excitement, noise, and screaming are calculated to provoke an attack.

Authorities differ as to the term of latency or incubation. In one case, apparently well authenticated, rabies supervened on the third day after the bite was inflicted. The virus may, however, be latent apparently for as long a period as twelve months, or more. The period of incubation may vary from weeks to months in two animals bitten by the same rabid dog. Eight or ten days seems to be about the utmost limit of the life of a rabid dog, the average being five or six days, but death may take place in a shorter time.

The instances of very prolonged latency of the disease in both man and the dog are open to the suspicion that a second unobserved inoculation may have taken place. However carefully a dog may have been watched after having received a bite, he is obviously liable to have incurred a second of so slight a character as to pass unnoticed. Similarly, during the period (of many years) in which the disease has been asserted to be occasionally latent in man, it may

actually have been communicated, not by the first wound, but more recently even by inoculation from the dried saliva of a dog, carried by the wind, and coming into contact with some insignificant scratch or abrasion, or by means of an infected dog licking the scratched hand not long anterior to the appearance of the disease. The fact that rabies has not been conveyed to the Australasian colonies by any one of the many thousands of dogs imported in the course of nearly a century would point to a period of latency generally, if not always, limited to four months, unless we suppose the sea voyage either develops it rapidly—thus insuring the destruction of the dog—or suppresses it altogether.

The following letter, published in the Daily News, may usefully be quoted as worthy of the attention of all who keep dogs: "Although frequently brought before the public, it is but ill apprehended, and will therefore bear repetition, that, of all maladies, hydrophobia is perhaps the easiest to avert if people will only be at the pains to acquire the necessary knowledge. The premonitory symptoms in the dog are so clear that, although the disease is in truth rare. it is astonishing that it should exist at all, and still more so that any person should contract it from an animal which he has under his own care. I will briefly enumerate the chief signs by which the inception of rabies may be diagnosed. (1) The dog exhibits some peculiar change of character. If previously gentle, he may become savage, or the reverse. He not unfrequently shows increased affection for his master, and a propensity to lick the human hand. As the poison may be communicated in this way, the habit should never be allowed, even in an apparently healthy dog. (2) He evinces a dislike to light and noise, crouching in dark, quiet places. (3) The tone of his bark is modified. (4) His tastes undergo alteration, and he will devour hair. bits of coal, cotton, and other rubbish. (5) He appears the victim of hallucinations, watching imaginary objects in the air, and sometimes snapping at them, as if catching flies.

This symptom is especially dangerous, as it usually precedes the violent stages of the disease, in which the animal is disposed to wander and bite. (6) Dread of water is, in the dog, no indication whatever of rabies, neither is its absence any guarantee of safety. It may possibly be observed, but as a rule the creature drinks with ease. Now, of the above symptoms, any one is sufficient to arouse grave suspicion, though hardly to call for the immediate destruction of the dog; and although warning is given two or three days before he becomes violent, he may "snack" at a moment when least expected. At the first signal of danger, he should therefore be placed in strict quarantine for a fortnight, and during this time no person or animal should be allowed within his reach. If, at the expiration of that period, he be quite well, he may be set at liberty; but, if further symptoms develop, he must be killed. Considering the terrible, and at present incurable, nature of the disease when once it shows itself in the human subject, it is plainly the duty of every man, alike to himself, his household, and the public, to observe these simple rules, and put them into practice when occasion demands; and if it were generally done, I venture to prediet that hydrophobia would soon be heard of only as a grim curiosity of the past.—R. H. JUDE (D.Sc., F.C.S., &c.)."

In many cases, there is no suspicion of the presence of the disease until the dog bites. Thus "M. D." writes to the Daily News: "Not long ago, a pet dog became ill, with symptoms which were at least very suggestive of rabies. Their nature was not suspected, and after the animal had bitten a child of the family, it was sedulously nursed, and actually died in its mistress's lap. The child subsequently died of hydrophobia."

Even with such full practical knowledge of the disease as is possessed by Mr. Hugh Dalziel, the well-known show judge, and for years the canine critic of the *Field*, the greatest risk may be incurred in circumstances giving rise to scarcely any suspicion of its presence. His Skye terrier bitch was slightly bitten, about Christmas, 1883, in the street, by a crossbred retriever. The wound healed well. Early in the following March, she became somewhat irritable, and made an attack on the Persian cat in the house, but did not bite it. The next day, Mr. Dalziel took her for a walk on the chain, when she showed a disposition (unusual) to rush at dogs, but was prevented from biting any. He then secluded her for the night; and in the morning the disease was fairly, but not strongly, marked. She was taken to Professor Pritchard, and destroyed, when the post-morten examination revealed indubitable rabies. This bitch had associated freely with the family, but bit no one, nor attempted to do so. though there is scarcely a doubt that she would have done so had not careful supervision been adopted before the most dangerous phase was reached.

The tendency of the rabid dog to gnaw various objects is sometimes exemplified in a singular manner. A terrier belonging to a lady of my acquaintance, when shut up on suspicion, bit off one of its own toes. The following, from the *Field* of 10th May, 1884, is an extraordinary case:

"On Monday morning, the 28th April, I was requested to call in the neighbourhood to see a fox terrier (dog), about two years old, and bred by the owner, which I was informed had completely bitten his tail off during the previous night. On arriving at the house, I ascertained that the dog was still shut up in his kennel in the garden. I went out to it, and, much to my surprise. I found that the information I had received was perfectly correct, and nothing of the tail -which was about 6in. long-remained. The dog answered to his name on being called, and seemed to wish to be noticed. My client was desirous that I should have him in my Infirmary, and, as I anticipated I had a case of rabies to deal with, I took every precaution in removing him. During that and following days, he continually tried to vomit, but unsuccessfully; he drank water freely, and ate a little bread and gravy. The following day (Tuesday), there were no further symptoms; but on Wednesday, when his box was being cleaned, he viciously caught hold of the broom, but beyond that there was no change. He continued to eat and drink, and his motions were natural. On Thursday afternoon, a stick was used instead of the broom, and he again flew at that, yet still continued to eat and drink a little; but, during the night, he bit the woodwork of his box, and, on Friday morning, died, without having shown any further symptoms."

"On making a post-mortem (at which Professor Axe, of the Royal Veterinary College, was present), I found every symptom of 'rabies.' I may add that this dog did not once give the well-known and distinctive bark of a rabid dog; also, that I carefully examined his kennel, which had not been touched since his removal, and could find no trace of his tail, with the exception of a few blood stains.

"Having mentioned this singular case to several members of my profession having extensive canine practices, and they agreeing with me that the case is worthy of notice, I trust you will grant me space in your valuable paper for inserting it.—E. M. DAVY, M.R.C.V.S.L."

A very strong popular impression prevails that rabies in the dog, and its equivalent in man, which goes by the unsatisfactory title of "hydrophobia," is necessarily fatal, and that the bite of a rabid animal always communicates the This is quite erroneous. Statistics, carefully collected both at home and abroad, warrant us in believing that about one in four persons and animals bitten by a rabidly diseased dog, escape altogether; while recoveries from the actual disease are by no means unknown in the case of man as well as of animals. In a memorandum read by M. Decroix before the Academy of Medicine of Paris, in 1882, nine cases of recovery (in about eight or ten days) are recorded, of which three were men, five dogs, and one a horse. M. Decroix remarks: "The scientific men who have not seen cases which have been cured, are very wrong in disregarding the cases reported by those who have seen them recover, and in publishing only unsuccessful cases, or those where there has been an error in the diagnosis, thereby forming erroneous ideas in the public mind." In the course of his own experience, M. Decroix, who is an Honorary Associate of the Royal College of Veterinary Surgeons of England, and a sound canine pathologist, has met with two cases of recovery.

There is, without doubt, very insufficient acquaintance on the part of medical men generally with the diagnosis of "hydrophobia" in the human subject; and a great many cases must be annually recorded of death from assumed "hydrophobia," which, though following on the bite of a dog, are not due to rabies in the animal that inflicted the bite, but may probably be ascribed to traumatic tetanus. The following letter, published in the Daily News of 14th Sept., 1880, is significant in this connection:—

"There are strong reasons for deciding positively that the case recently described in a police court, where a boy showed strange symptoms some time after being bitten by a dog, is not one of hydrophobia. (1) The symptoms are not those of hydrophobia; (2) No human being has yet been known to live a week after showing the first signs of the disease; (3) No dog suffering from rabies ever lives more than eight days, and very few reach the fifth (in this case the dog that inflicted the bite is still alive and well); (4) The bite of a dog cannot give rise to hydrophobia unless the animal be absolutely rabid at the time it inflicts the wound. It may be safely accepted as a fact that no bite can cause hydrophobia if the dog be alive eight days after inflicting the bite. This is a positive test of the condition of the wound, and all dogs causing a suspicious wound should be retained under observation for a week at least. By destroying a dog immediately after it has bitten anyone, we destroy the most valuable and positive evidence of the nature of the wound.—Your obedient servant, WM HUNTING, F.R.C.V.S."

Cases of reputed hydrophobia are frequently mentioned in the public papers; but, if carefully analysed, the greatest proportion of them would be rejected as spurious. Amongst these are instances where persons of a highly nervous temperament have been bitten, and are so wrought upon by the fear of "hydrophobia," that symptoms become developed which pass, even among medical men, for the disease. is a case in point. It may be well to give it as I communicated it to the Country, while every circumstance was fresh in my memory. A woman, while attending to her child on the first floor of a house in one of the suburban parishes of London, saw a small strange dog enter the room (it had lived in the house recently with the former occupants, and therefore its visit to its old home was quite natural), and, being alarmed for the safety of her child, seized the intruder and endeavoured to throw it out of the window, when the dog, in the struggle, with great good sense, bit the woman on the hand, in self-defence. She at once called in a resident surgeon and had the wound cauterised. From my knowledge of the locality, I should say an interval of twenty minutes would probably have elapsed. A few days afterwards, she went on a visit to the country under strong apprehension on the score of "hydrophobia," and some time afterwards returned with symptoms which the medical man, on being again called in, pronounced to be those of "hydrophobia." She died about two months after the bite was inflicted. At the inquest, before a well-known London coroner, witnesses detailed the facts given above, and the medical attendant gave evidence to the effect that the death resulted from "hydrophobia," arising from the bite of a mad dog, and it was so recorded! I took much trouble to ascertain that the dog was of very quiet disposition, that the family to whom he belonged kept him shut up subsequently to prevent him from being lynched, and that he was alive and well after the woman's death. Here was a verdict, given by a coroner's jury, in direct opposition to the facts, which could have

been ascertained had any knowledge of the subject prevailed among those officially concerned in such investigations. Obviously, complete reliance was placed on the testimony of the medical gentleman, who, it should be said, had a deservedly high reputation for ability and experience in his profession, but was clearly deficient in his knowledge of rabies in the dog, and its counterpart in the human subject.

The following case of reputed "hydrophobia," which was treated at one of the leading metropolitan hospitals in 1876, is, in many respects, so instructive, that I give extracts from the notes made for me by one of the surgeons in attendance on it from first to last: "The patient, J. S., aged twenty-five, was reported by his wife to be much given to drink, was drunk every Saturday night, very violent indeed, even when not under the influence of drink, had had three fits (epileptiform), and, with this exception, had never had a day's illness. On the 16th of December, 1875, when walking at night, he trod on a dog's foot, and, in return, was bitten on the face, the leg, and the left arm. The wounds on leg and face were very small; that on arm was a lacerated one, of considerable depth, and more than an inch long. All three wounds were freely cauterised that night, by a surgeon. In fourteen days, they had all healed without trouble—no dressing. would not have them touched, and seemed excited whenever they were alluded to. On the twelfth day after the accident, he complained of pain in neck, starting from region of wound, and numbness of left arm; he was foolishly obstinate. and would not admit the bite as the cause. Has seemed dull and low-spirited since Christmas. Used to brood over accident, though never confessed to it. Has looked peculiar since-eyes wild and wandering." (The above, being the wife's account of the description of the symptoms, may, in some respects, be tinged by imagination.) "On the day before his death, he slept with his eyes open, talked in sleep. &c. When told of this in the morning, he seemed agitated

and frightened, but still asserted that it was nothing to do with the bite."

The day on which the hospital record begins is January 21, 1876, which, in the absence of anything to show the contrary. may be taken as the day of admission. "Patient sitting up in bed, face slightly flushed, but this appears to be the nor-There is an anxious expression, not a caremal condition. worn look, but one rather of fright, or anxiety on account of some impending danger, and the general behaviour of patient is such as to lead one to think that he takes a 'fearful' interest in surrounding objects. When people come into the ward, patient quickly catches their footfall, and looks fixedly at them. His attention is arrested by slight objects, and he appears to rivet it on objects and actions which would remain unnoticed by others. Every few minutes, gives a sigh, not ordinary sigh of relief, but consisting of sudden. quick, respiratory act; does this when spoken to quickly. or when slight draught arises from window, &c. Displays difficulty in getting words out and on beginning to talk, and, when speaking, keeps up a rapid tapping at the chest with right hand, because, as he says, 'speaking seems to hurt me, as if there was something gnawing me there.' 6.30 p.m.—Patient taken no food; on two occasions, he put ice into his mouth, and apparently swallowed the water with great difficulty, expressing himself on each occasion as relieved. . . From 3 to 4.30, had been quite quiet, talking easily to visitors. After this, repeated spasmodic movements supervened, which came on suddenly, causing him to jump up and roll himself forward or double himself up, at the same time violently rubbing epigastric region, shout for help, and then, in a few seconds, would lie down quite easy, repeating frequently, 'There, now I am better.' At other times, he would throw his arms out, keeping them rigidly extended and hands tightly clenched. Morphia given, hypodermically, and in five minutes great relief. Every now and then, takes deep inspirations, and then lets out the air by repeated

short expiratory acts. Pupils acting (to light) equally dilated. Heart acting regularly. Respirations very irregular. p.m.—Effects of morphia wearing off; a few spasms, in one of which he started from lying on his back, ground his teeth, beat the bed with arms, turned over, and buried his face in pillow, struggling with the attendants. Nearly every muscle seemed affected; legs became as hard as wood. Dr. --recommended chloroform to be given, to render patient sufficiently unconscious to allow of passage of food into stomach, either by short tube or stomach pump; and afterward morphia, to induce sleep. If spasm of glottis and consequent asphyxia (the immediate cause of death), he would perform tracheotomy. No benefit from ice to spine. In Dr. ----'s opinion, food must be given somehow, as, exhaustion becoming greater, the spasms would increase. 10 p.m.-Patient placed in padded room, and strait jacket put on. The moment vapour of chloroform came near him, the sensation of choking came on with terrible violence and great lividity. As each inhalation produced such violent symptoms, it was discon-Morphia given, and patient left for the night.

"22nd January, 5.30 a.m. - Medical officer called to see From 11 last night to 4 a.m., patient slept quietly and continuously; on awaking, he expressed a wish for port wine, and asked for water; on seeing the latter, the spasms were very frequent and violent; had an extremely wild look between attacks; . . . eyes very prominent, and pupils dilated; profuse sweat; breathing heavily; slight tremor in extremities. . . . Morphia again given, and water injected cold, as enema, to allay thirst, repeated hourly. 9 a.m.-Medical officer again called to witness the most severe spasms it is possible to conceive; every distortion of attitude was quickly gone through in succession; loud shouts of 'Murder,' &c.; morphia evidently losing its effect. but patient craved for its repetition, even though it gave only a few moments' relief. 10 a.m.—Patient very violent, and for the first time there were well marked delusions. . . ." (It is not necessary to give these details.) "The same fright-ened look. Movements now seemed not so much the result of involuntary spasms as of premeditated design. . . ." (Attempts to injure the attendants are here described.) "Two porters cannot now hold him. . . . Countenance fearful; struggling as if for life; after this, sank down much exhausted; a momentary glance at a rotating ventilator set up most violent spasms. Becoming much weaker. Once or twice, the air escaping from lungs burst open the glottis, with a short, sharp ring, soon becoming like bark of dog, and his movements, &c., appeared crouching, and generally simulating those of a dog. 3.30 p.m.—Patient died.

"During his illness, he often remarked that the dog was not mad—'No more mad than I am.' During the whole of the two days, he did not appear to swallow his saliva, but spat a great deal of frothy matter."

The patient was probably right. There was no evidence that the dog was rabid. Soon after the accident, he summoned the owner before a magistrate in London, on the ground that he allowed a ferocious dog to be at large. On hearing the man's account of the accident, and evidence of the quiet character of the dog, the magistrate decided that, merely because the man had accidentally trodden on the dog, and had been bitten, it was no proof that it was a dangerous animal, and refused to make an order for its destruction.

Any remarks I might make on examples of this and the former are rendered unnecessary by the subjoined paragraph from the Lancet:

"The fallacies attending a diagnosis of hydrophobia are strikingly illustrated by a case which occurred, a few days ago, at Leamington. An inquest was held on the body of a woman, aged forty-six, who was popularly supposed to have died in consequence of hydrophobia, caused by the bite of a cat. A month after receiving the bite, a convulsive attack ushered in a period of restlessness and nervousness, during

which the bite was evidently foremost in her mind. These symptoms lasted ten days, and suggested to the medical men in attendance the probability, and to the friends of the deceased the certainty, of hydrophobia. Its distinctive symptoms, however, were absent; and on the eleventh day, an attack of epileptiform convulsion occurred, followed by hemiplegia, coma, and death. A certificate of apoplexy and hemiplegia was properly given, but the popular supposition of hydrophobia led to an inquest. This was adjourned, in order that a post-morten examination might be made, which showed meningeal hæmorrhage and granular contracted kidneys-conditions amply sufficient to account for the whole of the symptoms. The case itself is instructive. Bites from dogs and cats are very common; cerebral diseases leading to general symptoms are not very rare. currence of the two incidents generally leads to the inference that the bite is the cause of the symptoms; and when, in addition, a state of nervousness and rabiophobia is present, the symptoms are rendered complex, and the diagnosis a matter of some difficulty."

There is, however, something more than a possibility—since spontaneous recovery from rabies is known to take place in both man and animals—that animals suffering from a mild attack may inflict wounds which communicate the disease in a fatal form, while they themselves recover, not having exhibited such marked symptoms as would lead to the conclusion that the disease was present in them.

With respect to the treatment of the bite from a suspected dog or cat, or even one that is not suspected, it must, in the present condition of knowledge, or rather ignorance, be simply local. Dr. George Fleming, F.R.C.V.S., in his excellent work on "Rabies and Hydrophobia," recommends: A. Suction* by the mouth, carried on persistently and energetically for some time, spitting out very frequently, and, if possible, rinsing the mouth with water, &c. B. Expression, or squeez-

^{*} See next page.

ing the wound, in conjunction with the above. C. Washing with cold or tepid water, poured from a vessel held at some distance from the wound. . . . F. Cauterisation, when immediate, is at once the promptest and safest treatment. The best instrument is a piece of iron heated to a white heat, in shape pointed, round, or the figure of an olive. Iron instruments of a suitable shape are at hand in every dwelling. and, while being heated, suction, washing, and compression (above the wound) should be resorted to. Gunpowder, a fusee. or a lucifer match, may be ignited in the wound when the iron is not immediately accessible. G. Caustics, solid or fluid, may be employed, with the same success, or they may be preferable or supplementary to the actual cautery. H. Excision and scarification should be practised when necessary, though they demand more skill.

Suction is recommended, in medical works, in the case of snake poison, but I believe it to be by no means safe, in view of the ready absorption of that virus by the mucous. membrane. Few mouths are free from slight abrasions, decayed teeth, or spongy gums (emitting blood on suction), and it may be a grave question whether the virus of rabies might not enter the circulation if this plan is resorted to by someone else than the sufferer; though, perhaps, the latter would not be further imperilled by sucking the wound himself; and he is undoubtedly under a moral obligation to take any risk on himself, if he can reach the wound, rather than allow another to incur it. Actual cauterisation, caustics. excision, and scarification, should not be entrusted to any but skilled hands. A ready mode of treatment by the general public is suggested by Dr. Fleming, when medical aid cannot be obtained. After cleaning the wound, by washing and compression, pour black ink—the coloured inks may contain injurious chemicals-into the wound, and wash out the stain and repeat the process. The object of this is to insure The same treatment as that recomthorough cleansing. mended by Dr. Fleming, excision, cauterisation, &c., may be

usefully applied to an animal which has been bitten by another of suspected or unknown character.

All treatment when the disease has developed itself seems ineffectual. The Committee of the Paris Academy of Medicine began, in 1874, a series of experiments with various drugs, using pilocarpin three times, and in every case the remedies hastened death by the violent convulsions they brought on. The conclusions of the Committee were thus summed up: (1) It has been experimentally demonstrated that cases of rabies may recover spontaneously. (2) Up to the present, no treatment has been proved to be anti-rabic, and cases of cure by this or that means may be attributed to the efforts of Nature. (3) All the means employed by the Committee since 1874 (up to 1882), comprising principally injections of azotate of pilocarpin, have hastened, rather than retarded, the death of the subject. (4) Those dogs usually recovered which were left without treatment, as the medicines brought on violent fits; and there is an inclination among medical men to leave human beings thus attacked in perfect quiet, and only prac-(5) Rabid people, left in the tise experiments on animals. dark and kept quiet, are not subject to fits, unless they are brought on by excitement or ordinary medicines.

The series of experiments by M. Pasteur, communicated to the Académie des Sciences on the 19th of May, 1884, were directed to the attenuation of the rabific virus with a view to its prophylactic agency, his previous notable discoveries in a similar field of inquiry giving high value to his investigations. The principle on which he proceeded was that which is now well established for some contagious diseases—viz., that the virus becomes diminished in energy by its passage through one or more subjects. He accordingly transmitted the specific virus from the dog to the monkey, and from one monkey to another, constantly diminishing its active power; and then, on re-introducing this attenuated virus into the dog, rabbit, guinea pig, &c., found it maintained its milder character. It did not then produce rabies

in the animals so inoculated, either hypodermically or by trephining—an infallible method of communicating rabies at It created a refractory condition of the animal against the disease, i.e., it was protective. The attenuated monkey virus was increased in intensity by successive transmissions through the rabbit and guinea pig, until it became even more powerful than the first-hand virus of the dog, and was invariably attended by fatal results in the latter animals. Thus, there was a descending scale through the monkey, and an ascending scale through the rabbit. The dog was found to completely resist the most intense form of the virus (raised to the highest point by several transmissions through the rabbit) when he had been previously inoculated by each of the samples of virus in succession. It is a significant fact that the lengthened period of latency supposed to accompany the disease is very rarely observed in experimental inoculation; and this should be borne in mind in conjunction with the immunity of the Australasian colonies from any invasion of rabies, and dispose us to regard with suspicion the statements of excessively prolonged incubation.

Some pathologists are inclined to doubt whether the virus experimented with by M. Pasteur was really rabific. However, a Commission was appointed at his request, by the Minister of Public Instruction, to compare the results of the inoculation from a rabid dog of a number of dogs treated by the attenuated virus, with those of the inoculation of an equal number of other dogs not previously protected; and the names of M. Bouley, M. Paul Bert, M. Tisserand, and Drs. Beclard, Vulpian, and Villemin, form a sufficient guarantee for the conduct of the investigation.

So far as the experiments by this Commission have yet gone, they have completely sustained M. Pasteur's position. Twenty-three healthy dogs, previously inoculated with M. Pasteur's prophylactic virus, were bitten by rabid dogs, and otherwise subjected to the strongest virus of rabies. Of nineteen others, not protected by M. Pasteur's method, six

were bitten by mad dogs, and three of these became rabid; eight were inoculated by intra-venous injection of the virus from a rabid dog, and five were inoculated with the same matter by trepanning—all becoming rabid. Thus, sixteen of the nineteen unprotected dogs succumbed, while all those previously protected with M. Pasteur's attenuated virus have resisted the effects of both the bite of the rabid dog and artificial inoculation with his virus. There is, perhaps, some significance in the fact that only three of the dogs bitten by the rabid dogs died, whereas all those artificially treated with the rabific virus became rabid. The natural bite, then, would appear to be not always certain to communicate the disease.

M. Pasteur, indeed, seems on the eve of giving to the world a discovery of the highest importance, and of not less practical utility to the animal world than to mankind; though, doubtless, as in the case of every other discovery made by means of physiological experiment for the relief of suffering humanity, it will be insisted that nothing has been discovered, and no benefit whatever has accrued from the researches!

As in the case of every other obscure disease, rabies has been the subject of endless reputed "cures" and specifics. Some fourteen years ago, a well-known and highly-respected gentleman, with, no doubt, the best intentions, proposed, in the Field, to raise a sum of money, by public subscription, to buy up the "secret" of the much-vaunted "Birling" cure for hydrophobia; but the editor very wisely threw cold water on the scheme, for the adoption of any nostrum does infinite harm, by engendering a false confidence in a pretended specific, to the exclusion of measures founded on surgical knowledge. A physician believed that he had found a specific in the powdered leaves of Xanthium spinosum, to be given in doses of 9½grs. twice daily for three weeks; but this and all others of a similar kind have broken down under the test of direct experiment in competent hands. The sup-

posed beneficial results of nostrums are, no doubt, due to a wrong diagnosis of the disease in most cases; and in some cases, the rabific poison may have worn itself out, and the subject has recovered, as he would have done without the "remedy"—as in those instances described by M. Decroix.

Our forefathers mingled more than a quant. suff. of superstition with their treatment, and one shudders to contemplate the course a person was expected to go through when bitten Galen recommends the ashes of a river crayfish, by a dog. burnt alive on copper, and assures us that no one who took The roasted liver of a mad this ever died of the disease. dog was highly recommended, and the sufferer was literally recommended "to take a hair of the dog that bit him." "Worming the tongue," i.e., extracting the little ligament beneath the tongue—a senseless and cruel practice—has been considered a certain preventive of madness, or, at least, of the power of communicating it to man, from the time of Pliny to the present. The more elaborate the compound, the more highly it was esteemed. "Palinaris's powder" was composed of equal parts rue, vervain, sage, polypody, plantain, mint, wormwood, mugwort, betony, balm, St. John's wort, and lesser centaury, dried and powdered with some coralline, and given daily, in drachm doses, in a glass of sherry, for a month. Some of the remedies were quite as likely to end fatally as the disease. None, except those of the most robust constitutions, could endure being bound to a tree and having 200 buckets of the very coldest water dashed over them; or survive being bled to fainting, then bound in a chair and fed on bread and water for twelve months-though a woman actually was so "cured."

Celsus insists on immersing the patient in the sea until he is nearly drowned, and making him swallow a great quantity of the water as "the only remedy." In the Philosophical Transactions of the Royal Society, we find a recipe for a decoctum ad morsum canis rabidi, consisting of tin filings, garlic, and rue, boiled in wine or strong beer, and mixed

with treacle. The unhappy patient must often have cursed the day in which he put himself into the hands of the faculty. Human fat—from the dead subject, it may be supposed—was a common ingredient of the poultices to be applied to the bite. A physician, of high reputation in his time, makes these sapient remarks on the mercurial treatment: "Should the mercury occasion a slight salivation, it could not but be attended with good success; for the poison of the rabies sticking to the saliva, and mercury naturally taking its course to the mouth, can it be doubted that this sovereign antidote in many disorders should not also destroy that which occasions the hydrophobia?"

In 1738, a surgeon—Mr. John Douglas—published a circular, in which mercury was employed to an alarming extent. pound of human fat, one pound of mercury, and the same of lard, was to be got into the patient by rubbing it over the body, inguinal glands, and axillæ, with, in the meantime, copious bleeding, and doses of cantharides. Poultices of sorrel. rue, roasted onions, bruised garlic, leeks, yeast, salt, mustard seed, and oil of scorpions, were highly recommended, and the anus of an old cock is directed to be put on the wound, "to draw out the virus." It was an easy matter to determine with certainty whether or not a dog that had bitten anyone was really mad. One had only to "pluck the feathers from the breech of an old cock, and apply them bare to the bite; if the dog was mad, the cock will swell and die, and the person bitten will ail nothing." The "curd of a puppy's milk" (whatever that may be) was held in high esteem, among other remedies which were handed down in families as really valuable heirlooms. Among charms and amulets, there is one attributing great virtue to the skin of a hyena. A piece of it was tied round the wounded limb, or the patient was benefited by merely looking at it. "The notion takes its rise from the aversion dogs naturally have for hyænas; whence it is strongly conjectured that this canine distemper should be removed on the sight or touch of the hyæna's skin, and the venom at once frightened away by this kind of amulet."

While the attitude of mind of the best physicians of the day towards the disease was such, nothing like calm inquiry or scientific investigation was to be expected. ever, may be anticipated from such researches as those undertaken by M. Pasteur, and the careful observations now being made by the large body of scientifically educated veterinary surgeons, who have replaced the incapable "cow doctors" and "dog doctors" of the past generations. The increased value of dogs within the past twenty years, has been a strong incentive to the study of their diseases. Where the safety of a valuable property is in question, there has been greater anxiety than where human life alone may be in jeopardy. Absolutely nothing has been done by the Legislature of this country to impose on the owners of dogs any restrictions or penalties calculated to ensure the public safety, or to diffuse even the most elementary knowledge of the symptoms and treatment of the disease, and to fix the responsibility of losses in human and animal life on those whose culpable carelessness has occasioned the mischief.

At a meeting of the Central Veterinary Medical Society, in July, 1882, Dr. George Fleming expressed his regret that medical men were so ill acquainted with the subject then fully discussed—rabies and "hydrophobia." How, then, can the public be expected to recognise premonitory symptoms, and realise their responsibilities? From information supplied me by the Secretary of the Inland Revenue Department, it appears that the number of licences for dogs issued in Great Britain, in the year ending 31st December, 1883, was The number evading the tax—and it is very large -would probably bring the total up to a million as the canine population. The deaths annually recorded as due to "hydrophobia" in the United Kingdom probably do not exceed an average of fifty. Those for England and Wales in 1882—the last year up to which the abstracts are completed—are no more than twenty-eight. A considerable proportion of these must be deducted for erroneous diagnosis. We may conclude this, then, to be one of the rarest of diseases, and the chances against any one of us falling victims to it, are something like seven hundred thousand to one. Nevertheless, it is a terrible disease, and, apart from its actual results, induces perpetual apprehension, which, in the aggregate, has a more serious effect on the community.

The first measure is to render the public familiar with the symptoms, and the precautions to be taken. This, as has been pointed out over and over again for years past, in the Field and other journals, may be done by printing the information on the back of the licence, or by posting it on the doors of all places of worship. The next is to make the owner of the dog responsible for any damage it does. On a licence being taken out, the licensee should receive a zinc plate, with a number, and the name of the owner and the issuing office stencilled on it, and be compelled to rivet this to the collar, the use of a false number being made penal. Any dog found without a number should be liable to be destroyed, after having been kept at the police station for a given time. Any owner who valued his dog, either for profit or pleasure - obviously no others are fit to keep such an animal—would comply with this provision, and his identification would be possible, and generally easy, in case of any mischief done by the dog. This would not be a hardship to any owner with a proper sense of what is due to his neighbours and his dog; while it would meet the case of him who is indifferent to both.

Under present conditions, if any damage occurs to man or beast through the action of uncontrolled dogs, or they show symptoms of disorder, they are commonly disowned, with the view of escaping responsibility. Dog fancying has increased vastly within the last ten years, and, to gratify a passing vanity—that of possessing an animal with half-a-dozen drops of prize blood, or the reputation of it, in his veins—

persons who have neither the knowledge, the will, nor the facilities for keeping dogs under sufficient control, often turn them out to pick up what they can in the streets and sleep on the doorstep, and thus expose the community to serious risk.

The disease of rabies is, by the testimony of veterinary surgeons in all parts of the kingdom, certainly on the increase, and if measures are not taken to stamp it out, it must, ere long, assume such proportions that little short of the destruction of the whole canine population, may become necessary, in the interest of the public safety.

There can be no doubt that that excellent institution, The Temporary Home for Lost and Starving Dogs, at Battersea, is doing valuable service in collecting the waifs and strays from the streets of London, returning to their owners those that are claimed, finding homes for others, and putting a merciful end to numbers of the crippled and diseased. Apart from its beneficent object, the public utility of such an institution must be apparent, when we reflect that the disposition of the dog when suffering from the virus of rabies, is to wander. He is taken charge of by the police, or by the officers of the Institution, and sent to the Home, where his condition is made the subject of close scrutiny. Should any suspicion arise, he is strictly isolated, and, if necessary, killed; while the dogs are at all times closely watched for the appearance of symptoms indicating this disorder.

In the Twenty-third Annual Report of the Home, we find 14,476 dogs were brought there in 1883 by the Metropolitan police, 103 by the City police, and 108 by private persons. Of this large total—14,687—1985 were claimed by their owners; 2188 were sold; and the remainder, 10,514, were destroyed as diseased or totally worthless. Rabies has, from time to time, appeared, the number of cases certified during 1883 being thirteen—not a large proportion by any means among a class of animals which, as wanderers, would be specially exposed

to the risk of contracting the disease. Notwithstanding that the police have been very frequently bitten in effecting their capture, and the keepers at the Home literally hundreds of times, more or less severely, neither hydrophobia nor any other serious consequence of the injury, has ever resulted to any of these men.

The destruction of the dogs has hitherto been carried out by the administration of prussic acid, with, of course, some danger to the keepers themselves, both from the dogs and the fumes of the acid, a method described by Professor Pritchard as "a momentary shock only; but the pain experienced during that moment is indescribably bad." In the opinion of several physiologists whom I have consulted, there is no pain whatever. However that may be, there always appears to me to be a moment or two of terrible suffering, and it is desirable to make absolutely certain that there shall be none. The dog possesses an extraordinary power of resisting poisons of the narcotic class.

A friend asked my help in destroying an Irish spaniel of about thirty pounds weight, suffering from cancer of the jaw. I procured eight grains of the best morphia, and gave this enormous dose to him, after keeping him twelve hours without food. Three hours afterwards, he was sleeping comfortably, but was easily roused by his master's voice. He was placed on his bed, in full expectation that he would pass away quietly during the night. Greatly to our surprise, however, he was alive in the morning, and walked down stairs, exhibiting no more effect of the poison than a slight unsteadiness in his gait. By the same evening, when I went to give him half an ounce of prussic acid, almost all trace of the effects of the morphia had disappeared.

It ought not to be necessary to caution unskilled persons against the use of such poisons as prussic acid; but there are those who, considering themselves skilled, readily undertake to destroy dogs, and often make a terrible blunder of it. The acid should be quite fresh, and should be carefully drawn from

the bottle into a syringe (not glass, as that might be broken by the dog's teeth, and cause partial failure), the quantity for a large dog being something near an ounce. The operator should put on gloves, and, taking the dog's upper jaw in his left hand across the muzzle, just behind the canines, exert some pressure, when he will usually open his mouth. At this moment, with the right thumb on the piston of the syringe, there should be no difficulty in injecting the whole of the contents into the back of the mouth, either from the front or side, the operator taking the precaution to hold his breath while this is being done.

In selecting this poison, it should be borne in mind that its quality, and consequently its energy, varies greatly. That dispensed according to the standard of the British Pharmacopeia contains only two per cent. of the anhydrous acid, while the preparation known as Scheele's has five per cent. more than double the strength. The latter should be used; the former cannot always be trusted to act rapidly and certainly, even in an ounce dose. Many chemists use old stock, or the B.P. preparation, and thus terribly prolong the sufferings of the animal they undertake to destroy. Prussic acid can only be kept under conditions calculated to prevent its deterioration when the bottles containing it are securely stoppered, laid on their sides in a box, and excluded from the light by a close lid. So necessary it is to provide against this possible deterioration, that no less quantity than halfounce should be given, and I have known that fail to act immediately with a dog over thirty pounds weight.

These suggestions are made only for persons of sufficient nerve and resolution to undertake to relieve an animal from suffering when the necessity presents itself, and when the case cannot be placed in professional hands. When the operator is known to the dog, and friendly with him, there will be little or no difficulty. A truly humane master will even do great violence to his feelings, by himself undertaking the last sad office for his affectionate friend (who will submit to be handled

by him in a manner to insure complete success), rather than entrust the duty to a stranger, with the risk of partial failure; but unless he can implicitly trust his nerve, he should not attempt it.

Happily for the large number of dogs which must be annually destroyed at the Home, a "lethal chamber" has been provided by Dr. B. W. Richardson, F.R.S., in which they will fall quietly into their last sleep, absolutely without pain, or even the apprehension of death. This chamber is filled with a mixture of carbonic oxide and carbonic acid gases. The animals are placed in cages, and wheeled into it on a truck, to the number, if required, of fifty at a time, and the inhalation of the gases is immediately accompanied by loss of sensation and rapid death.

Should any evidence be required of the total and painless deprivation of life by this method, I am able to supply it from a fortunate personal experience. Some years ago, I entered a room in which a charcoal fire stove had been burning three or four hours, but I believed it to be sufficiently ventilated. After the lapse of some little time, I experienced a rather agreeable sensation of drowsiness and fatigue, but entirely without apprehension of danger, or even thought of the charcoal fire, the insidious narcotic carbonic oxide gas from which was really depriving me of consciousness. Thinking it merely an intimation to retire to rest, I rose from the light low chair on which I had been sitting; at that moment, total oblivion must have overtaken me, the mind recorded nothing whatever subsequently, but the event showed that I had fallen back and broken the chair, and lay on the floor with my head immersed in the fatal gas. An attendant coming in to look at the fire, dragged me into the open air, where I soon recovered, and, with the exception of a bruise or two, was nothing the worse for having passed into a condition of absolute death, so far as regarded consciousness; while, had this been prolonged for a few minutes, my peaceful sleep would have known no awakening.

I am perfectly confident that the dogs who enter Dr. Richardson's lethal chamber will, if my own experience and sensations are to be trusted, pass, without a pang, and without apprehension or distress, into true euthanasia.

CHAPTER VI.

The Mind and Character of the Dog — Instances of Intelligence and Concerted Action in Wild Species — The Influence of Association with Man — Sir John Lubbock on the Education of Dogs — Similarity of Mental Processes in the Dog and in Man — Travelling Dogs — The Moral Sense of the Dog — Fossil Representatives of the Carnivora.

WE may now turn to the more pleasant task of considering the mind and character of the dog in health. In intelligence, as such, he is, perhaps, not superior to the elephant or monkey; but in no other animal do we find that devotion to man which is a trait of the moral character, and raises him far above all others. "He that can endure to follow with allegiance a fallen lord" may well read a lesson to time-serving humanity. His virtues have been celebrated in prose and song by some of the highest in intellect and the noblest in character; but, strange to say, the poet who of all men was most catholic in his sympathies—Shakspeare -has scarcely a good word to say throughout his writings for the universal friend of man. With very few exceptions, all his allusions are unfavourable. He makes Launce, it is true, when apostrophising his dog, say: "Nay, I'll be sworn I have sat on the stocks for puddings he has stolen; otherwise he had been executed. I have stood on the pillory for geese ne has killed; otherwise he had suffered for 't." And there is, perhaps, a kindly touch in the passage in "King

Lear" which runs: "Mine enemy's dog, though he had bit me, should have stood that night against my fire."

In her excellent work on "The Animal Lore of Shakspeare's Time," Miss Phipson quotes an incident from Sir Henry Holland's "Recollections of Past Life" strikingly illustrative of this indifference or dislike: "Lord Nugent, the greatest Shakspearian scholar of his day, declared that no passage was to be found in Shakspeare commending, directly or indirectly, the moral qualities of the dog. A bet of a guinea was made, which Sir Henry, after a year's search, paid. This was before the publication of Mrs. Cowden Clarke's Concordance. The only passage which could have a chance of winning the wager is the answer of Timon:

APEM.—What man didst thou ever know unthrift that was beloved, after his means?

Tim.—Who, without those means thou talk'st of, didst thou ever know beloved?

APEM.—Myself.

Tim.—I understand thee; thou hadst some means to keep a dog.

Timon of Athens, Act IV., Sc. 3, 113."

There is a fine subtlety in this, which ought to have entitled Sir Henry to the guinea, and goes far to atone for the general attitude of hostility exhibited by Shakspeare. Throughout all literature, from the time of Homer—excepting among the Hebrews—there has been a generous recognition of those moral qualities in the dog which have probably become evolved in him through long association with a being who, rightly or wrongly, has held in his esteem the place of a god.

The development of the dog's mental and moral character under domestication is indisputable, though some wild species exhibit an extraordinary intelligence in circumstances where man must be quite an unfamiliar animal to them, and where they could have had no previous experience of his machinations for compassing their destruction. Some years ago, there

appeared in the *Daily News*, evidently from the pen of an experienced Arctic traveller, an article entitled "Christmas near the North Pole," the following interesting extract from which illustrates the power of reflection in a wild animal:

"On the morning of Christmas Day, we rose earlier than It was not a bitter morning by any means. air was deliciously calm, and the sky slightly cloudy, with a pleasant temperature of 64 degs. below freezing point, or 32 degs. below the zero of Fahrenheit. At breakfast, there were already signs of luxury, as, in addition to tea, we had each man six ounces of biscuit. Then the cook and his mate put the plum-pudding into the pot, whilst I went to visit a gun set for white foxes, at which one of these pretty little animals had been shot some days before. On going up to the gun, I found that something was amiss. The line attaching the trigger to the bait seemed out of place, and on examination I found the line cut and the bait gone. The footmarks of the fox on the snow showed clearly how the clever little creature had gone to work so as to get his Christmas breakfast without danger to himself. The little fellow had probably seen his comrade shot, or noticed him dead, for evidently this one had studied the position of the gun with great care from all points of view except directly in front of the muzzle. From the numerous tracks, and the marks where he had sat down like a dog upon the snow, his front always towards the gun, it was evident that he had first carefully studied the situation, and then deliberately (his deliberation was distinctly marked by the shortness of his steps) gone up and cut the line where it hung below the line of fire. He had then carried the severed end of the line attached to the bait to one side, and afterwards gone straight up to the bait and eaten, it. Was this practical or abstract reasoning on the part of the fox? He had certainly no experience of guns set to shoot foxes, with the one possible exception in the case of his comrade, whom he might have previously seen killed, for there were no guns used within 600 miles of

the place. However this may be, I was delighted that the beautiful and clever creature had not only saved his life by his intelligence, but had obtained a small Christmas breakfast into the bargain; and I could not resist the temptation to lay out some food for him, in order that he might enjoy his Christmas dinner without fear of gun or trap."

Other Arctic travellers have found the foxes dig under steel traps placed on the snow, and, springing them from beneath, eat the bait in safety. The Eskimo trap, however, is more successful. This consists of a heavy slab of ice, propped up by a small upright of ice whose lower end rests on the meat, in pulling which away, the fox brings down the slab. These materials, being familiar to the animal, probably disarm his Moreover, he cannot possibly get at the bait suspicion. without bringing down the slab, and hunger, no doubt, may overcome his caution. The Eskimo have two barbarous, but very ingenious, methods of killing wolves, described by Lieutenant Schwatka. They set in the snow a couple of sharp knife blades, covered with blood, which the wolves lick, cutting their tongues. At first they do not feel the wounds, but go on licking, stimulated by the taste of their own warm blood, until their tongues become so scarified that they bleed to death. Many are killed by bending a strip of whalebone, and inclosing it in a piece of frozen meat. The meat thaws in the wolf's stomach, when the whalebone straightens and pierces the intestines, causing certain death.

The sight of unfamiliar materials has a great effect on the mind of animals—thus, a farmer protected his lambs from foxes by tying a piece of red or black braid round their necks. This, he asserts, entirely stopped the ravages of the foxes among his lambs, which were reared in a field adjoining a large covert. Unfamiliar scents will, it seems, also deter foxes from attacking lambs; for a Dorsetshire farmer daubed their necks with a mixture of assafætida and tar, and subsequently lost none of his lambs.

I had often heard it stated that foxes rid themselves of

fleas by taking a piece of sheep's wool in their mouths, and immersing the whole of their bodies, except the nose, in water, when, being driven out of the skin, the insects took refuge in the piece of wool as the only dry place of access; but could not make up my mind to believe so extraordinary an example of reasoning without the clearest evidence. The following account, by M. A. Paladilhe, in *Nature*, 6th Nov., 1873, is strongly in support of the fact:

"On one occasion, when I happened to pass my college vacation at the Chapelle d'Angillon, my attention was attracted twice or three times, when rambling by the side of a small stream called the Petite-Saudre, by a floating mass of moss, which, when drawn to the bank, was found to be swarming with fleas. An old peasant of the neighbourhood, who observed my surprise, gave me the following explanation, the correctness of which, said he, he could warrant. Foxes are much tormented by fleas, and when the infliction becomes severe, they gather from the bark of trees, moss, which they carry in their mouths to the side of a stream where the water deepens by degrees. Here they enter the water, still carrying the moss in their mouths, and going backwards, beginning from the end of their tail, they advance by slow degrees until the whole body of the animal, with the exception of the mouth, is entirely immersed. The fleas, during this proceeding, have rushed successively in rapid haste to the dry parts, and finally to the moss; and the fox, when, according to his calculation, he has allowed sufficient time for all the fleas to take their departure, quietly opens his The floating moss, with its interesting freight, is carried away by the stream, and the animal finds his way back to the bank, with a feeling of much satisfaction at having thus freed himself from his tormentors. Many persons, and very trustworthy ones, confirmed to me the old peasant's account." The finding by M. Paladilhe of these bunches of moss, with their insect freight, goes very far towards establishing the truth of this singular account, for

fleas have no business in the natural way to congregate in such material.

Concerted action among animals, for the purpose of carrying out a definite plan, seems to me to imply even higher intelligence, for it presupposes communication of the purpose in some way, or at least a common understanding of the object to be attained, and of the method of procedure. A striking example of this was given by Lieut. Neville Chamberlain, A.D.C., of the Central India Horse, in the Field, 30th Sept.:

"About 2 p.m., a tiger had killed one of my cart bullocks while he was grazing in the jungle within half a mile of camp. In my absence, they had put up a machan on a tree near the carcase, but they must have made so much noise that the tiger was frightened, and had left that part of the jungle; for, though I rode down to the place on my pony and sat over the kill till dark, no tiger appeared. I was well repaid, however, for going, for I was favoured with a very interesting sight.

"The sun was getting low, everything was quiet in the thick jungle round, and I was thinking about moving homewards, when a peacock behind me called, and I hoped it was the tiger returning for his evening meal. A few seconds afterwards, a rustle on the leaves followed; and yet, though I strained my eyes, I could see nothing. Suddenly, stealing along, with their noses up, drinking in the delicious fragrance which came from the dead bullock down wind, I saw a small pack of wild dogs, seven in all. Their bright rufous colour had, no doubt, made the peacock, who must have seen one of them, think it was his enemy, the tiger.

"They circled quietly round the glade where the kill was lying, as though suspicious of a trap; but finally they seemed to make up their minds that there was nothing to fear, and, led on by the largest of the pack, a fine fellow with a large bushy tail, they crept up to the carcase in Indian file. One good look to see if the coast was clear, and they

rushed in to the unclean feast. It was now that they did what I have never read of wild dogs, or indeed of any other wild animals, doing. Only three of the party commenced feeding. The other four, as if it were only part of their usual routine, trotted off into the jungle, and, during the whole time their friends were feeding, they were engaged in a ceaseless patrol of the adjoining neighbourhood, crossing and re-crossing each other at a distance of from eighty to one hundred yards from the kill.

"Presently, one of the three seemed to have taken the edge off his appetite, for he left the bullock, rolled and rubbed his nose in the grass, and then, trotting off on his tour of duty, relieved the nearest vedette, who ran in to enjoy the carrion. And so, in turn, each one got his share, no doubt enjoying the feast the more from the knowledge that friendly sentinels were on the alert, and that he would get timely warning of any approaching danger. Their system of outpost duty is, in fact, unrivalled, and our best light infantry might with advantage have taken a lesson from them."

Cases are frequently quoted by good observers, of foxes and wolves hunting their game towards an ambush where one of the number lies in wait to spring upon it. A friend of Dr. J. G. Romanes' sent him an account of concerted action of a very elaborate character. His friend was watching in a tree, near a lake in India, to shoot a tiger which was expected to come to drink there. About midnight, a large axis deer came out of the dense jungle, and, after sniffing the air as though it suspected the presence of an enemy, began drinking, and continued to do so for a long time. When quite swollen with water, it turned to enter the cover but was met by a jackal, which, with a sharp yelp, turned it back.

The deer appeared much startled, and ran along the edge of the lake for some distance; and, on again attempting to enter cover, was met by a jackal and kept in the open. This the watcher could hear repeated several times in the still night, the yelping becoming fainter with the distance. The jackals appear to have posted themselves in line, just within the cover, and when the deer had filled itself with water, kept it in the open, knowing that if they made it exert itself in that plethoric condition, it must soon be winded and fall an easy victim to them. A native shikari who was present declared this to be a common stratagem with jackals, which hunted thus in large packs. Division of labour in this systematic manner implies as much as could be expected of man himself in similar circumstances.

Some years ago I was acquainted with a colley and a grey-hound who used to hunt in concert thus. The hares on Dartmoor squat on the tops of the broad stone walls, where some short brushwood of coarse grass grows. The colley used to hunt along the walls, the greyhound meanwhile walking a few yards ahead, attentively watching the movements of his companion. The instant a hare was started, the greyhound was ready to pounce upon it, and, by some means, known only to that sagacious colley, the hare was almost always compelled to break on the side where the greyhound was in waiting. Before puss had time to recover from her surprise at being thus "surrounded," she was snapped up.

Just as I was rolling up my blanket, early one morning in Queensland, preparatory to lighting the fire to boil my tea, I heard the heavy thud of a kangaroo leaping at full speed in some distant scrub, and, grasping my gun, I lay flat on the earth, hoping for a shot. A few moments later, a dingo appeared on the outside of the cover, sneaking along parallel to the kangaroo, and pausing occasionally to listen, but, as the event showed, unnoticed by the hunted animal. Never before having seen a kangaroo hunt conducted by native dogs, I watched it with great interest. Presently, at scarcely a hundred yards from me, the kangaroo suddenly broke cover, and the outside dingo, for whom he was certainly unprepared, ran in to him and had him by the shoulder in

a moment. A second or two later, another dingo dashed out of cover and took him on the opposite side. In an incredibly short time, they had laid him out dead. It was very clear that one dog had been chasing the kangaroo in cover, and at a propitious moment hustled the quarry out right into his companion's jaws.

After a minute or two, I strolled up and cut some fine fresh steaks for my breakfast, an act of confiscation that may be excused, inasmuch as I had nothing to eat, and there was a march of twenty miles before me without any probability of getting anything. What havoc they had made in a short time! The chest was torn open under the fore leg, and the neck bitten through in several places. These wild dogs seem to know perfectly well where the great arteries are situated, and how to finish off a kangaroo while avoiding a blow from his formidable hind claws,

I lived for some time in a house in Queensland which abutted on a much frequented road, and possessed a comfortable room on the first floor, with a balcony and wide It was the habit of Carlo I., and the house dog. verandah. a pointer named Don, to lie on this balcony, where they could command a good view of the road for a long distance in each direction. Sitting on the balcony, reading or writing, I had frequent opportunities of observing these two dogs communicate with one another. One, perhaps, would be lying asleep on the balcony, and the other strolling about in the road. He in the road would notice a dog coming along, and hurry upstairs to inform his companion, and the two would run down into the road to interview the stranger. the balcony would be the first to see the dog, and at once go off to give the intelligence to the other.

One day, business took me into the neighbouring town. Carlo I. would, on such an occasion, keep constant watch from the balcony towards the afternoon, and as soon as he saw me approaching—so the people in the house said—would rush all over the house, in a state of excitement, to find his

companion and ask him to join him in going to meet me. The only outward and visible sign of communication was a momentary contact of the nose of the informer with the nose of the dog to be informed. Whether this conveyed any specific information, such as "There's a dog coming down the road," or "My master is in sight," or merely a general intimation that something interesting to both was to be seen, may be an open question; but there can be no doubt, I think, that specific information is often given by one dog to another, and that solely by sign language.

Thus, Mr. E. C. Buck, writing to Nature, 14th August, 1873, says: "A civilian of the N.W.P. told me of an occurrence he witnessed in Oudh. He saw two wolves standing together, and, shortly after noticing them, was surprised to see one of them lie down in a ditch, and the other walk away over the open plain. He watched the latter, which deliberately went to the far side of a herd of antelopes standing in the plain, and drove them, as a sheep dog would a flock of sheep, to the very spot where his companion lay in ambush. As the antelopes crossed the ditch, the concealed wolf jumped up, seized a doe, and was joined by his colleague."

The same stratagem has been observed in the case of two sheep-killing dogs—a small one driving them to the ambush where his larger confederate lay ready to pounce on the victim. When two individuals thus perform different acts for the attainment of an object, there must be some means, of which we are ignorant, of communicating the common plan, and such actions imply high intelligence. As there are some savages who can carry on long conversations and concert plans solely by means of signs almost imperceptible to us, it is not impossible—not even improbable—that animals may possess a simple gesture language, which, from want of close observation, we do not detect.

When two dogs meet, and more particularly when two of opposite sexes meet, a great deal of facial gesture goes on, by which they are certainly communicating their emotions, if not actual thoughts; and I have been enabled to interpret this quite accurately with one of my retrievers. is disposed to be very quarrelsome, and, from paying great attention to his manner, I know when he has given, or is about to give, the silent challenge which culminates in a desperate attack, and promptly seize him by the collar. On the other hand, I can be quite certain when, after inspecting his adversary, he has discovered nothing to raise his angry passions, and can walk on in confidence that there will be no breach of the peace. I cannot so readily perceive the signs of the rising tumult in the breast of the other dog, but my own dog, no doubt, understands the slightest shades of meaning in his expression. Some years ago I sent to the late Charles Darwin a number of cases bearing on this subject, and his reply was: "I quite believe that animals do somehow communicate together; but how they manage to do so I do not at all know."

Among the habits acquired by the dog through association with man, one of the most useful to us is that of "pointing." This act has become an instinct in sporting dogs, and strongly inherited, though it is entirely artificial. Probably it had its origin in the act of the wild ancestor pausing momentarily before springing on his prey, now so greatly exaggerated and prolonged that this habit has become totally different from anything observable in any wild species. Shooting snipe, one winter, on Dartmoor, over a very staunch old pointer, afforded me opportunities of seeing how long a good dog will "stand" game. In the long grass that grows on some of the mires, it was impossible to see him when he was at a point, and, being totally deaf, calling or whistling him was of no avail. On one occasion, I had been searching for him at least a quarter of an hour, and feared he might have got bogged in a peculiarly treacherous part of the mire. Eventually, I found him standing rigid as a rock, shivering with the bitter cold, his coat stiff with icicles, from the splashes frozen by the cruel wind which swept over the moor. As soon as the gallant old fellow saw me, he rolled his eye towards me, staggered forward a few paces, and I walked round him, and up sprang the miserable little jack snipe that had kept him there on duty until he was almost dead with cold. Never did I feel so much satisfaction in knocking down anything as that pestilent little jack; but the poor dog was evidently worn out, though he crawled off again with unabated pluck to quarter the ground. I believe he would have remained on that point until he dropped from exhaustion—a condition he had then almost reached. After taking him on to solid land, and rubbing him thoroughly dry and warm with wisps of heather. I walked him home gently, reflecting the while on the singular force of this artificial instinct imposed upon the dog by our own agency.

The training of dogs for shooting could not have been begun earlier than the middle of the sixteenth century; for we then first hear of "hail-shot" coming into use. thus possible to limit the development of the pointing instinct to about three centuries. If we estimate the average life of the dog at five years, it will be seen that within sixty generations of dogs the instinct has attained its present perfection, aided by selection. Whatever was the exact meaning of the term in his time, Shakspeare says ("Henry IV.," Act II., Sc. 3), "'Tis our setter, I know his voice." Assuming the dog so described to have been at all comparable as a worker to the modern setter, the instinct had become established, partially at least, at an early date after the introduction of the shot gun. But the most singular fact is the transmission of the instinct to their young by well-bred and trained setters and pointers. As all breakers know, puppies of these breeds will hunt for game the first time they are taken into the field, and often even point it after two or three hours' work, without any previous tuition whatever, and without the example of older dogs. The mere scent of

grouse, partridge, or pheasant, which they have never even seen, arouses in these puppies a dormant consciousness, and a strong disposition to assume the attitude which has been habitual to their ancestors for many generations. This thoroughly justifies the sportsman's anxiety to obtain dogs of good pedigree.

My own retriever Carlo I. never saw another dog work until he could do everything that a dog ought, in finding, standing, and retrieving snipe and quail, and bringing duck to bag from the exceedingly difficult ground of the Australian "ti-tree" swamps, and that without much in the way of tuition from me; and at a very early age he exhibited remarkable powers of reflection. It was my custom to shoot, together with an old friend, on a creek emptying itself into Moreton Bay. The wild fowl which we drove before us down the creek invariably went to a salt swamp about half a mile from its mouth, where we attacked them at 10 a.m. and made the bag of the day; after which, breakfast (consisting of a single biscuit and a draught of water) was served out to "all hands"—viz., two men and a dog—on the only spot of dry, firm ground within miles. The creek wound about through a dense fringe of mangrove scrub. the stems of which in places stood but a few inches apart. In this scrub I lost my dog, then a mere puppy, and failed to bring him up to call. Rushing about in the wet and dense cover, he was unable to hear me. After some time, I gave it up as a hopeless task, trusting that he would find his way home, notwithstanding a lurking apprehension that he might wander for days without food or water among those thousands of acres of salt marshes, and die, as more than one man has, a miserable death. Perhaps no human being-not even the blacks-had so mastered the intricacies of that desolate breeding ground of wild fowl as had my friend and myself, and the dog had frequently been over it with us, and, as the event proved, must have possessed a strong sense of locality. On arriving at the breakfast placetwo miles at least from the place where I lost him—I found him waiting, anxiously expectant, by the dead log on which we used to sit at breakfast, and with every appearance of having arrived there some time before. He must, when lost, and finding it impossible to foot me over the wet mud, have made up his mind to come to this place, reflecting on the probability of our going to a spot connected with a certain routine in the day's sport, where an event of importance to him always occurred—that welcome drink of fresh water after four or five hours of hard work.

I do not intend here to discuss the "homing" instinct in dogs, having said all that I am able to say on that subject when considering it in the case of cats, p. 50 et seq. There are now before me a large number of examples published in the correspondence columns of the Field, Nature, and other periodicals of high reputation. While there is no ground for impugning the veracity of the narrators, their knowledge of the particular habits of the animals of which the stories are told is obviously deficient, and there is, besides, a large element of uncertainty in the accounts. I will, however, give two instances within my own knowledge.

A gentleman living in the same house with myself at Hampstead gave away his dog-of breed indescribable, but a knowing character—and he was taken away under the seat of a phaeton, and by rail, far down into Essex, all communication with home being thus completely severed. days afterwards, Master Don quietly walked into the old house as if nothing had happened. I was naturally very much surprised. As far as I or anyone else knew, he might have come straight up from Essex by himself. On examining his feet, however, I felt convinced that he had not made a long journey. The nails were not worn, and the hair between the toes was long. This was conclusive against his having travelled any distance within the time of his absence. A friend connected with a respectable but not over

critical journal, devoted to the interests of animals, happened to come in the same evening, and, on hearing what had occurred, wrote an account of it, as a marvellous instance of "instinct" in an animal which had been taken by rail into Essex, and subsequently found its way back to Hampstead. In vain I pointed to the incontestable evidence, from the condition of the dog's feet, and urged him to wait until some information could be obtained. This story was published, and no doubt accepted by hundreds of readers as an unquestionable instance of the exercise of a wonderful faculty which no one can explain! With some little trouble, I ascertained that the dog had remained quite contentedly at his new home in Essex, being allowed his liberty after the second day; that he did not satisfy his owner as a house dog; that on the eventful tenth day, he had been brought up to London, and sold to a publican; that he escaped the same day, and, as we have seen, arrived at Hampstead in the afternoon. For two years previously he had been in the habit of strolling about London just as he pleased. I met him myself once in Holborn, and he was frequently seen in other parts of London-his master, who was employed all day in the City, exercising no control over him whatever. This confirmed vagabond, when he escaped, was no doubt within ken of some place familiar to him, and took the first opportunity of going back to his old friends. Hundreds of similar cases could be as easily and certainly explained, if someone would take the pains to pick up the missing links.

The following account was given me by my friend, Mr. W. B. Challice, of his fox terrier, Miss Muffet, one of the most devoted and intelligent animals I have ever known: "We were living in Wimpole-street, and Miss Muffet was only eight months old, when she was taken out one Saturday night, in May, 1873, by a servant, while the streets were crowded, on account of the illuminations all over the Westend, in commemoration of the Queen's birthday, and lost at the bottom of the Haymarket. Nothing more was heard of

her that night. On the following day, at about 5 p.m., she returned home, and this is the way she managed it: she seems to have spent the night in getting back to the neighbourhood of Wimpole-street, and then, having entered Harleystreet (which is so like Wimpole-street as to confuse even experienced town travellers endowed with human reason), she probably mistook it for Wimpole-street, and her efforts to find her home became, of course, for the time, fruitless. At about 7 a.m., the puppy was met by a milkwoman, who was passing on her rounds. This woman had been in the habit of delivering milk at the home of the dog, and, in fact, had only just left the early supply there. It is important to remember this, that the woman did not know the dog, but the latter knew her, and she attached herself to the woman, and refused to leave her all day, in spite of every effort made to get rid of the wanderer. Neither would she accept any food. She thus persistently accompanied the woman until the time for the evening delivery, evidently knowing that she would eventually be taken to her home, if she remained with the person who was in the habit of going there. On arriving at her home with the milkwoman, at 5 p.m., who described how she had been followed closely by the dog throughout the day, the puppy received a rapturous welcome, and, after taking a biscuit and a little water, slept for fifteen consecutive hours."

Now, here, it may be observed, the only link between the known and the unknown was the milkwoman. Had the dog left her a few moments before she arrived at the house, probably no mention would have been made of the circumstance, because the woman did not know to whom the wanderer belonged. Had this link been dropped from the chain of evidence, the return of the dog would have been attributed to "instinct"; whereas it was clearly due to reflection—a mental calculation of the probability that the woman would revisit the house at the accustomed hour. No human being, supposing such a one incapable of making

any inquiry, could have adopted a more rational method of escaping from the difficulty.

The sense of locality became subsequently highly developed in this dog. Mr. Challice writes: "Muffet went to live with me in chambers in Southampton-street, Strand, and occasionally visited the old home in Wimpole-street with me. One morning she frightened a tradesman coming up the stairs of the chambers, by barking at him in her threatening but harmless manner, and before I went to my office in the City, I administered a slight correction. On my return in the afternoon, the housekeeper told me that the dog, soon after I left, went into the kitchen, jumped upon the dresser, cried for a few minutes, and then dashed out of the house, and away up the street. I went to Wimpole-street to tell my sisters of my loss, and was met in the hall there by Muffet, who had arrived at 11.15 a.m.—about twenty minutes after she had left the chambers in Southampton-street!"

"Some months afterwards, a similar fault having been committed, and a slight correction administered, the same result followed—a visit to Wimpole-street for sympathy. About a year and a half after the first flight, the home in Wimpole-street was broken up, and the day after the sale I took her with me and saw the dismantled house. visited all the rooms in which her puppyhood had been spent, and seemed uneasy at their bare and forlorn condition. The next day I took her to King's Cross station to bid farewell to my sisters, who were going abroad. The parting was affecting on both sides. Two days after this, she again barked at a tradesman in my chambers, and for the third time received a mild castigation. She did not this time seek consolation in Wimpole-street; she never went there of her own accord again. Once, when I took her there, to call on the new occupants, friends of ours, she renewed her acquaintance with the scenes of her early youth, but has never since sought them voluntarily."

About a year after these events, when she had formed an

extensive acquaintance with London and its suburbs through taking long walks in almost all directions with her master, I invited him to spend two or three days with me in Churchrow, to shake off the dust of Southampton-street, and breathe the delicious air of the "leafy month of June" on Hampstead Heath after office hours. He arrived with Muffet in a cab, and we went out the same evening with my two retrievers, much to Muffet's satisfaction at finding herself in such excellent canine company. She had, I think, visited the house once before, on a winter's evening after dark. The next morning, her master went to the office at 10.30, leaving her in my room. She at once began to bewail his absence, and I thought it safe, an hour after his departure, to invite her to come for a walk with me and my dogs, because she had not learned to "foot" him. As soon as she was released, she searched every corner of the house for her master and then dashed out of the house to return to Southamptonstreet—some reader may perhaps anticipate me by exclaiming. Nothing of the kind, let me assure him. She went up stairs, with an air of deep dejection, jumped upon his bed, and sat there, howling piteously and incessantly, until he returned at 4 p.m. Well as she knew me, she would not suffer me to approach the bed to offer her food or water. She was in a strange house, without any sign of her master's intention to return-for he had taken his hand-bag and umbrella with him to the office—and must, therefore, have been under the strongest possible inducement to go out, as she was quite free to do, and search for him, either at his chambers or in Wimpole-street. Why did not the "homing" instinct come into play here, and impel her to return to one or other of the old resorts? Because, in my view, having been brought to the house in a cab, she did not know how to return, and, being conscious of her inability, preferred to wait for the chance of her master returning in the afternoon, as had been his invariable habit elsewhere. Had he not reappeared the same day, very probably the strain on her mind would have

overmastered all other considerations, and impelled her to make a desperate attempt to find him.

The fact that every year great numbers of dogs are lost, and subsequently restored to their owners through the agency of the police stations and of the Dogs' Home—1985 were so restored by that useful institution in 1883—seems to me incontrovertible evidence against the possession by these animals of any "instinct" or special sense enabling them to find their way home without previous knowledge or experience. It is at least certain that all dogs are not endowed with this mysterious faculty, and that is a presumption against its existence in any of them, for no such individual deficiency is found in other animals which exhibit well-marked instincts.

When that great metaphysician, John Locke, laid down the law thus, as to the faculties of animals: "This, I think, I may be positive in, that the power of abstracting is not at all in them, and that the having of general ideas is that which puts a perfect distinction betwixt man and brutes, and is an excellency which the faculties of brutes do by no means attain to," he could never have imagined that, in the nineteenth century, another distinguished philosopher should have deliberately set himself the task of teaching his dog to read! This, however, Sir John Lubbock has done, and with a considerable measure of success. He began by giving the dog food in a saucer, over which he laid a card with the word "food" printed on it in large letters, placing also by its side an empty saucer covered by a plain card. The dog soon learned the distinction between the cards, and to bring that on which "food" was written. One morning he brought the "food" card nine times in succession, selecting it from among other plain cards, though the relative position was changed every time. When, as happened sometimes at first, he brought a plain card, his mistake was pointed out to him, and he took it back and changed it. Of course, the dog was rewarded with a little food when he brought the proper card.

In a note to Nature, 17th Jan., 1884, Sir John says, "I may take the opportunity of stating the progress which my dog Van (a black poodle) has made, although, owing greatly to my frequent absences from home, and the little time I can devote to him, this has not been so rapid as, I doubt not, would otherwise have been the case. . . . The essence of my idea was to have various words, such as 'food,' 'bone,' 'water,' 'out,' &c., printed on pieces of cardboard, and, after some preliminary training, to give the dog anything for which he asked by bringing a card. I use pieces of cardboard about 10in. long and 3in. high, placing a number of them on the floor side by side, so that the dog has several cards to select from, each bearing a different word." The dog is not guided by scent, but solely by eye, because a number of cards bearing the same word are used. "When, for instance, he has brought a card with 'food' on it, we do not put down that identical card, but another with the same word; when he has brought that, a third is put down; and so on. For a single meal, therefore, eight or ten cards will have been used; and it seems clear, therefore, that he must be guided by the letters. . . . I have no doubt that he can distinguish between different For instance, when he is hungry he will bring a 'food' card time after time, until he has had enough, when he lies down quietly for a nap. Again, when I am going for a walk, and invite him to come, he gladly responds by picking up the 'out' card, and running triumphantly to the front door with it. As regards water, I keep a card always on the floor in my dressing room, and whenever he is thirsty, he goes off there and brings the card with perfect gravity. If, through inadvertence, he brings a card for something he does not want, when the corresponding object is shown him he seizes the card, takes it back again, and fetches the right one. No one who has seen him look along a row of cards, and select the right one, can, I think, doubt that in bringing a card he feels that he is making a request, and that he can not only perfectly distinguish between one word and another, but also associate the word with the object." On the same subject, Col. H. Stuart Wortley says: "I had a remarkably clever Skye terrier, which I taught as follows. When I went out, it was quite sufficient to say 'Yes' or 'No' in an ordinary tone; but, wanting to take him beyond that, I taught him very quickly to know the two words when painted on cards, 'Yes' or 'No,' and, after a few weeks' teaching, he never mistook them."

The process of learning this, in the case of the animal, is identical with that the human mind goes through in its first lessons. A letter is an arbitrary sign for a sound, and a combination of these signs constitutes a word. The sounds corresponding to the signs, and their combinations, must be repeated to the child until he learns to associate the pictorial representation unfailingly with the sound itself. Lubbock's dog's mind clearly goes through all this, and, further, he signifies his wishes by bringing to his master the card which bears the sign for "out" or "food." Locke, and others who thought there was a radical difference between the human and animal mind, would find it impossible to draw any distinction here. A very interesting field for experiment in the study of animal psychology is thus opened up; and most of us possess dogs of intelligence sufficient to For example, the Rev. W. H. work upon with success. Colmore, of Moseley Vicarage, writes to me: "The dog I spoke to you about, when you lectured for our Institution here, belonged to a lady in my parish, and was a fox terrier. The performance was this. The lady went up stairs, and placed three things on her bed-a tobacco pouch, a pockethandkerchief, and a newspaper. She then came down stairs, and asked me to say in what order I should like these things to be brought down by the dog. I replied, in the order above mentioned; accordingly, the lady told her dog to go and fetch the tobacco pouch. Off he went, and immediately returned with the tobacco pouch in his mouth. She then told him to go and bring the pocket-handkerchief. This he also

did with wonderful alacrity, and was then sent for the newspaper. Not quite satisfied, I asked that the performance should be repeated, and the lady at once consented. I now named the articles in a different order, but the result was the same; the dog was equal to the occasion, and each time brought the precise article he was sent for." An animal which could thus identify any object so thoroughly with the name proper to it, would assuredly have no difficulty in learning to "converse," as Sir John Lubbock terms the result of his method of instruction with the printed cards.

Notwithstanding the opinion of philosophers, even of the high standing of Descartes, I cannot bring myself to believe that animals do not reflect-i.e., cogitate on their ideas independently of any external stimulus-and turn over in their minds events recorded by memory. For, as their possession of the faculty of memory is beyond question, there can be no reason why it should not be exercised in the same manner as in ourselves, though less persistently and less comprehensively. The familiar fact that the dog "hunts in dreams," shows an abnormal stirring of the ideas stored up by memory; and this must surely occur more definitely, and in the normal manner, in his waking hours. The work of the retriever is of a very complicated character, demanding much judgment, since different animals employ different methods for eluding the pursuer, whose tactics must be varied accordingly. When the dog has mastered the difficult business of retrieving duck, we cannot suppose all the ideas associated with that work to lie absolutely dormant in his mind until they are suddenly aroused by the sight of a duck. Can we imagine him never reflecting on these ideas without an immediate stimulus? is contrary to all analogy with our own mental processes, and, while we have no evidence on the negative, and much on the affirmative side, we are warranted in believing the mental operations to be of the same nature, much as they may differ in degree.

That dogs, at all events, retain events in their memory for

a long period, and, therefore, probably reflect upon them in the interval, is certain. There is such a case in my Australian diary. Having shot a couple of teal, where it was extremely difficult for my retriever Carlo I. to work, as the ground was covered by shallow water, in which lay scores of trees felled by a hurricane, and pitched about in confusion one over another, I picked up one of the birds; and, seeing that the dog was unlikely to recover the other-a winged bird, diving among the débris of broken branches—I called him off; much to his disappointment; for he would have felt with his nose under every half-immersed log in the swamp, rather than have left a bird he knew to be hiding somewhere at hand. It was quite a week afterwards that I was in the neighbourhood, but at first unconscious of being near the place, when, looking up in my face pleadingly, my friend began to show signs of anxiety. Thinking he had some good reason for this, I indulged him, followed his lead, and soon found myself at the spot where we had left the wounded teal. Here he went to work as if the bird had but just fallen, and I let him have a few minutes at it, after which he came off with a determined air, and gave it up. The lost bird had long ago departed from my memory, until recalled by the dog's actions. Not so my friend-he had it down in his "shooter's diary," a blot on his professional reputation, to be wiped off if possible; so that, as soon as he neared the place, he asked leave to make another effort.

Towards the evening of a long day's snipe shooting on Dartmoor, a party, of whom the late Sir Robert Torrens (author of the famous Registration of Titles to Land Act, adopted by the Australian colonies) was one, were walking home along the banks of the Dart, when the same dog flushed a widgeon, which fell to my gun, in the river, and, of course, instantly dived. I said not a word to the dog. He did not plunge into the river there after the bird, but galloped fifty or sixty yards down stream, and then entered

the water, swimming from one bank to the other up stream, until he came near to the place where we stood. Then he landed, shook himself, and carefully hunted down the near bank for a considerable distance, crossed the river, and diligently explored the opposite bank. This had occupied two or three minutes, and the party were for moving on, as snow was falling, and we were all thoroughly tired. "That's a lost bird, depend upon it; and, with this bitter wind, no dog could find it if it fell on the bank, especially after his long day's work," said one; and all were for giving it up.

But I knew my retriever. He was not to be beaten if the faintest trail could be found. Just then I called their attention to a change in his movements. His "flag" was up now, and waving from side to side in the energetic manner that betokens a strong scent. I was then confident that the bird was as safe as if it was already in my bag. Away over the top of the heather could be seen the waving tail, moving steadily on, until, at some thirty yards from the bank, there was a momentary scuffle, the bird just rose above the ground-it proved to have the tip of the wing broken-the dog sprang up and caught it, dashed across the river, and delivered it into my hand. "I never witnessed so perfect a piece of workmanship in all my life," said Sir Robert Torrens; "you have a grand dog there." Still the party could not understand the dog's peculiar tactics, which 1 explained as we trudged home. By long experience in the Australian swamps and creeks, and in the narrow, sluggish streamlets of the La Plata, he had learned that a wounded duck, owing to his weakness, goes down stream-if winged, his maimed limb sticks out, and renders it impossible for him to go up-and will invariably endeavour to land, and slip away into any cover he can find. But if the dog dashes into the water where the bird fell, the latter will continue going down stream for an indefinite distance, rising now and then for breath, and giving infinite trouble. My dog had

found out all this long ago, and had proved the correctness of his knowledge times without number, and, by his actions, had taught me the habits of a wounded duck. His object—I say it without the shadow of a doubt, because I have observed it so often—was to flurry the bird, by cutting off its retreat down stream, and force it to land. Then, after giving it time, and assuming, as his experience justified, that the bird had got ashore, he hunted down each bank in succession for the trail, which he knew must betray the fugitive.

I was quite ignorant of this habit of a wounded duck, until I learned it from the movements of this dog. So also were many old duck shooters, until I called their attention to The total disappearance of a duck from a small and shallow pool, only a few square yards in extent, had often perplexed me. Other dogs I had seen hunt such a pool for a long time fruitlessly, while it was certain the duck would have been seen if it had risen to the surface. One day, in Australia, the mystery was solved. I saw the duck sneak out of the water when the dog had crossed it, and crouch quite flat at a short distance from the bank. There was absolutely no cover. I walked close up to the bird, and stood looking at it. It lay perfectly motionless, trusting to conceal itself by absolute quiescence, but, as I stooped leisurely to pick it up, it dashed off into the water again and dived. It very soon re-emerged close to the opposite bank, and crept ashore. Then I took the dog round, and it was secured. After this, I always let him alone, and watched his business-like and confident method. After beating the pool, he quietly hunted round it, and picked up his In my volume of "Zoological Notes," pages 275-6, the stratagems adopted by wild fowl in concealing themselves are fully detailed. The point I wish to enforce here is, that Carlo I. made himself master of all these wily tricks, and, in doing so, must have exercised the faculties of comparison and reflection, and of generalisation of ideas, as fully as any human being could have done in the circumstances; and to him I am indebted for all the knowledge I possess of the habits of wounded ducks when endeavouring to evade pursuit.

Though we have, by selection, obtained such contrasts in size as that between the Newfoundland and toy terrier, and though, in many cases, we have rendered the appearance of the dog quite ridiculous, we have not thereby injuriously influenced his mental and moral character. Among my canine acquaintances was one belonging to my friend Mrs. C. S. Pringle—a black and tan toy terrier, with goggle eyes, and a skull suggestive of water on the brain-who stood second to none in intelligence and in devotion to his mistress. This gallant little fellow, the moment he was outside the door, constituted himself the champion of his mistress. As soon as a dog appeared in the far distance, "Drei" started off on the war-path, determined to demolish the biggest It was a treat to see him circling round the enemy on the tips of his toes, challenging the adversary to the battle in as mighty a voice as ever issued from the breast of a guinea pig; but always too magnanimous to take advantage of his conscious pluck and determination by striking the first blow. This noble forbearance was the admiration of all who knew him, for I am certain he never regarded size as of any importance in battle. He seemed to say to the other dog, "I don't intend to disgrace myself by beginning a vulgar row; but, if you really mean fighting, you can have plenty of that here, let me tell you." natural consequence of this morally and physically unassailable position, the other dog always retired abashed, and "Drei" returned to his mistress's side, rejoicing in his bloodless victory.

One day Mrs. Pringle came home in much tribulation. bearing the little warrior on her arm, wounded and dejected. and said that, as he was passing a fence, a fox terrier dashed suddenly through a hole, and gave him a severe shaking, and he was saved from destruction only by the timely use of her parasol. Supposing me to have some acquaintance with the different breeds, she asked whether fox terriers were always such savage brutes. I replied that I did not think so; but they were often taught to kill rats, and that perhaps a mistake occurred in the hurry of the moment. It was a cruel suggestion, for which I was not forgiven until she sent me the following account of the little fellow's intelligent behaviour, which shows what can be made of these usually disagreeable and pampered pets under wise management, and when they are allowed to lead natural lives and develop their faculties: "When my boy Edward was so ill in the spring, I used to hurry over my meals as much as possible, scarcely ever being more than five minutes at any one of them, so as to return and be with 'Drei' soon found this out, and, after a few days, him. disappeared into the kitchen as soon as my husband rang the bell at dinner for the soup to taken be away, the dog knowing that I was then sure to go away. In about a fortnight Edward began to be a little better, and one evening, feeling very weary—when my husband had rung the bell, and 'Drei' had, as usual, run out—I said, 'I shall sit here a few minutes longer, and rest awhile.' My husband went on with his dinner, but we did not talk. In less than five minutes, we heard a short, sharp bark at the door, a demand for admittance. My husband let - the dog in, who forthwith scrambled on to my lap. We should have thought no more about it, had not Bertha [Mrs. Pringle's maid] said to me next morning, 'I should like you to hear what "Drei" did last night. When he left the dining room, as usual, he got into his bed in the kitchen, but, in a very short time, began to be restless, and sat listening, and ended by leaving his bed and making me open the door for him. watched to see what he would do next. He ran straight to the mat at the foot of the stairs, sniffed vigorously at it, then looked slightly puzzled, but, after a moment's hesitation, he got on the first and then on the second step, and carefully examined both by smelling them. He then turned round, and, without going near the drawing room, ran to the dining room door and barked sharply. Now all the time Edward had been ill I had never crossed the threshold of the drawing room; so closely had he observed my habits that, when he had failed to hear me leave the dining room, he noticed this change, and, finding by his nose that I had not gone up stairs, he became convinced that I had not left the room in which he had last seen me."

It should be explained that the boy was suffering from gastric fever, and his mother excluded the dog from the sick chamber, lest he should distress the patient by his attentions. Thus, her departure from the dining room was the signal for their separation, and on the very first occasion when a change took place in her movements, he discovered it, and determined to rejoin her.

As another example of reflection, the following was sent me by Miss Barbara Reeve, who was an eye-witness of the occurrence: "At my own home we had a colley, unrestrained except to act as watchdog and to understand that at the word 'church' he must always turn homewards. Nevertheless, he was a highly successful poacher; there were paddocks on either side of the garden, and along the top a narrow strip of plantation, bounded by two walls. When a hare was started, he would chase it with loud barks until it entered the narrow passage. He would then quickly turn, and silently be in readiness at the corner to pounce upon his prey as it emerged at the other end. At first he brought his prizes to the kitchen door for exhibition, but ceased to do so after one of them was presented to the gardener's wife." The same lady vouches also for the following, on good authority: "A Scottish minister had a very intelligent dog, the sole pet of the household. One day, the clergyman's sister got a present of some chickens, which seemed to arouse the dog's jealousy, for he lost no time in killing and burying them.

Suspicion having fallen on him, he was called into the study, and ordered to produce them immediately. He promptly obeyed, and laid them down at his master's feet, who, for sole punishment, administered a solemn rebuke, looking and speaking exactly as if he had been addressing an offending parishioner. He even remembered that he wound up with an impressive movement of his hand, and with the words, 'and now I leave the matter to your conscience.' I do not believe that the culprit understood what was said, but the tone and manner affected him so much that he pined away, and died very soon afterwards, refusing to be comforted." For my own part, I am scarcely disposed to accept the inference drawn in the last sentence, although remorse is certainly exhibited by dogs, whence we may with confidence infer their possession of the moral sense.

The similarity of the mental processes, in ourselves and animals, may be seen in their behaviour when under the influence of abnormal states of mind. To them, as to us, the unknown and mysterious is also the terrible; and they may even, as I shall show presently, be the victims of superstition. One of my retrievers could be made miserable by working on his superstitions. I played a practical joke on the poor fellow once, which upset him for some days afterwards. Having stuffed a suit of my own clothes in the form of a guy, and provided it with a mask, painted in tolerable resemblance to my face, and put on its head a cabbage tree hat, which I was accustomed to wear, I instructed a friend to set up this effigy in the porch, just outside the hall door, some two hours or so after I had left the house. At dinner time, when I was in the habit of returning, my friend knocked at the door, and the dog, expecting to see me, ran out, and jumped up at the figure—to welcome, as he thought, his master. uncanny thing neither moved nor spoke. The dog gazed at it a moment, then dashed up stairs in terror, and hid himself under my bed. He had expected to see his master. These were the familiar clothes, with the well-known straw hat, but

the thing was devoid of movement, speech, and scent. He had only seen his master's ghost. Some ten minutes afterwards, I returned, went up stairs, and called him by name. He came slowly from beneath the bed, trembling, licked my hand, laid his head on my knee, and uttered a moan. It had evidently been a great shock to him, from which he did not fully recover for some days.

When this dog was about seven months old, and thoroughly accustomed to the sound of the gun, I was crossing some fields with him, when a sudden and heavy clap of thunder (a sound he had never heard before) broke overhead. stood for a moment transfixed, then rushed wildly off homewards, paying no attention whatever to my call, which he was in the habit of obeying implicitly. For a quarter of a mile I could see him racing for his life, with his tail down, in the utmost terror, never turning his head once in answer to my repeated commands to return. that day to this-ten years ago-thunder has been one of his unsolved mysteries. Courageous as he is in all things else, a lowering sky makes him anxious, and a clap of thunder sends him to my side in alarm. Could he understand what makes the noise-if it had its origin in any of the machinations of man-it would have no terrors for him. When a train crosses an iron tubular bridge, and we happen to be passing beneath, the sound, similar as it is to thunder, has no effect on him, because he understands the source of it.

Dr. Romanes had a setter which was similarly terrified by thunder, and on hearing distant artillery practice when out shooting, would bolt home; or, if at a great distance from home, would endeavour to bury himself, mistaking the sound for thunder. No doubt the keeper was right in expressing his belief that were the dog taken to learn the cause of the noise, his alarm would disappear. No dog will, I am convinced, ever be "gun shy" if he is made to understand the cause of the noise, by first firing a very small charge from a gun in his presence, and gradually increasing it up to the

full charge. But firing a full charge, without any warning, near a nervous dog is likely to set up a terror which he will not entirely overcome. His confidence in man is such that he has no fear of anything which he thoroughly believes to be originated by him.

There is much ground, of great interest, in animal psychology still unexplored, although so much has been done to elucidate mental phenomena by such works as Dr. G. J. Romanes' "Animal Intelligence" and "Mental Evolution in Animals." Whether or not, as Comte thought, animals have some crude ideas of "fetishism" or "animism"—a view strongly combated by Mr. Herbert Spencer in his "Principles of Sociology"—they behave in exactly the same manner as many human beings, when inanimate objects move accidentally, or are made to move experimentally, in some way inconsistent with their uniform experience of such objects. Dr. Romanes has made some experiments on this, which are of so much interest that I trust he will pardon my quoting them; especially as, having appeared in Nature (27th Dec., 1877), the original account may be difficult of access to many readers: "The terrier used to play with dry bones by tossing them in the air, throwing them to a distance, and generally giving them the appearance of animation, in order to give himself the ideal pleasure of worrying them. On one occasion, therefore, I tied a long and fine thread to a dry bone, and gave him the latter to play with. After he had tossed it about for a short time, I took an opportunity, when it had fallen at a distance from him, and while he was following it up, of gently drawing it away from him by means of the long and invisible thread. Instantly his whole demeanour changed. The bone, which he had previously pretended to be alive, now began to look as if it really were alive, and his astonishment knew no bounds. He first approached it with nervous caution, but as the slow receding motion continued, and he became quite certain that the movement could not be accounted for by any residuum of the

force which he had himself communicated, his astonishment developed into dread, and he ran to conceal himself under some articles of furniture, there to behold at a distance the 'uncanny' spectacle of a dry bone coming to life. . Taking him into a carpeted room, I blew a soap bubble, and, by means of a fitful draught, made it intermittently glide along the floor. He became at once intensely interested, but seemed unable to decide whether or not the filmy object was alive At first he was very cautious, and followed it only at a distance, but as I encouraged him to examine the bubble more closely, he approached it with ears erect and tail down. evidently with much misgiving, and the moment it happened to move he again retreated. After a time, however, during which I always kept at least one bubble on the carpet, he began to gain more courage, and, the scientific spirit overcoming his sense of the mysterious, he eventually became bold enough slowly to approach one of the bubbles and nervously touch it with one of his paws; the bubble, of course, immediately vanished, and I certainly never saw astonishment more strongly depicted. On then blowing another bubble, I could not persuade him to approach it for a good while, but at last he came, and carefully extended his paw as before, with the same result; but, after this second trial, nothing would induce him again to approach a bubble. and, on pressing him, he ran out of the room, which no coaxing would persuade him to re-enter."

A few days after reading Dr. Romanes' interesting account, I tried the same experiment on my retriever, Carlo II. It is useful to add a teaspoonful of glycerine to the pint of water in making soapsuds for this purpose, as the bubbles last longer and bear more rough usage. He behaved at first in much the same way, and could make nothing of the transparent objects which floated along the floor at my lightest breath, and vanished at the touch of his nose when I ordered him to bring them to me. The "scientific spirit" (as Dr. Romanes happily terms it) in him was perhaps stronger than

in the other dog, for I ordered him to sit up, and let him see me dip the pipe into the bowl and blow a bubble before him. This I placed on his nose, where it remained a second or two before bursting. I let him smell the pipe and the bowl of suds, and blew a few more bubbles, while he watched me with evident signs of inquiry. Subsequently, I have never succeeded in inducing him to undertake any philosophical investigation into the nature of soap bubbles. When I blow them, and order him to bring them to me, he simply puts his paw on them with an air of contempt, and wags his tail. He has found out that I make them, and there is no longer any mystery in it; for to him "whatever is, is right"—when he is assured that his master and friend has the doing of it.

Some years ago I tried the effect on this dog and his companion, Hector, of attracting their attention, and then distorting my features in every possible way. It should be said that I had tried the effect frequently of entering the room unexpectedly, with masks of various patterns on my face, but, beyond a momentary glance at my disguise, the dogs were not in any way moved by the fraud; though once Carlo I. put up his paw while I was gazing steadily at him, and endeavoured to tear the mask from my face, thus indicating his perception of its artificial character; for he certainly would not have risked hurting my real skin by such an act. I found it impossible, too, to gain his attention to any grimaces I might make; whereas Hector, a dog of very serious character, was always more or less strongly moved. While I was twisting my features about, he would watch me intently and anxiously for a moment, and then shrink away, with his tail down, and glance furtively at me from a corner of the room, or turn his head away, and put up a paw with an air of If I followed him about the room, he would retreat nervously, and bark in a peculiar tone once or twice, endeavouring to get under any piece of furniture. As soon as I allowed my features to resume their natural expression, and smiled, he would come up to me and exhibit his sense

of relief and affection by thrusting his head between my knees—in his usual manner—and wagging his tail slowly. He never could overcome his dread of seeing his master's features thus distorted in a manner so inconsistent with his ideas of the fitness of things. Dr. Romanes' terrier behaved in a similar way; but, as I should judge from his description, was not so strongly moved.

Many animals are indifferent to, and seem almost unconscious of, the death of their fellows. I have had only one opportunity of seeing how the presence of death affects a Hector was very much attached to his mother, with whom he had lived ever since his birth. When he was about four years old, her health began to fail rapidly from natural decay. For a few days before her death, she walked with difficulty, and slowly, but her son always kept in close attendance on her, instead of going off to play with the other dogs, when we were out for our morning constitutional. One morning, she was too weak to accompany us, and was left on the mat in the entrance. Returning in the afternoon, I was met by my landlady at the door, with the not unexpected intelligence, "Poor Zoe is dead! She crawled down stairs, about an hour ago, into the back kitchen, and died without a struggle." Hector, as usual, went to look for his mother, and I followed. He stood near the body, craning his neck, and sniffing the air, obviously deeply impressed by the presence of death, and when I stooped down to place my hand on his mother's heart, to assure myself that it was all over, he turned, and went hurriedly up stairs with a cry such as I have never before or since heard from any dog. While I was sewing the body up in stout canvas, and preparing a box for her decent burial, Carlo I. looked on attentively at the proceedings; but though he once or twice touched the body with his nose, and appeared to be puzzled, he exhibited no emotion. In the evening, when all was ready for her removal to the grave, I could not refrain from calling Hector down stairs. He came reluctantly, approached the box, which was

then placed near the door, smelt it once, and again ran up stairs in a state of much agitation. For some time, nothing would persuade him to enter the kitchen where his mother had died, and I observed him once peering in, as though he expected to find the awesome thing still lying there as he had seen it when he first experienced the shock of the mystery of death.

An important part of the knowledge of many animals is derived from imitation, and man, the most intelligent of all, is perhaps most indebted to this faculty for individual progress. Indeed, some individuals among us appear to possess little else than the imitative faculty. The Chinese have constructed exact imitations of European machines, ships, &c., without even knowing what was the object of the different parts. Monkeys, with their very inferior moral faculties, are highly imitative; so are savages, and those wretched presentments of humanity, microcephalous idiots, in whom the moral sense appears to be wholly wanting, or at all events of the lowest character. Imitation, then, though valuable in conjunction with other faculties, would seem to be of comparatively little importance in itself, as a measure of the general intelligence. Dogs, so far as I have observed, are singularly deficient in the imitative faculty. The "backing" of pointers and setters may be to some extent imitative, but much is also due to training; and steady "backing" on all occasions is a valuable accomplishment, which, as sportsmen know, cannot be depended on. No doubt, as in training retrievers, the youngster working with an old dog is materially assisted by seeing what his unconscious preceptor does. But there is really very little that he can learn by imitation. In his first lessons, he sees the old dog run after the ball, and bring it to his master, or go into the water and retrieve the stuffed ducks—an excellent object for this purpose, by the way. It is often the most difficult part of his training to induce him to take the water and bring the object right to hand, without dawdling or allowing his attention to be distracted. Therefore, I have always kept up a succession of retrievers to help the youngsters over this preliminary step in their special education. Beyond that, there is little for them to learn from a teacher of their own kind. If worked much on game with a trained dog, they are apt to become dependent, and merely wait upon him, and then squabble for the game when it is found. Professional trainers, or "breakers" of sporting dogs—as they are usually called with too much truth, for they often break everything out of a dog—would probably regard my kindergarten method of training as downright heterodoxy. So it is; but where they turn out now and then a fairly good slave among their failures, my method produces no failures, no slaves—all thorough workmen, to whom toil in my service is their highest pleasure.

However, as this is not a dissertation on training retrievers, it behoves me to return to the subject of imitation. Professional trainers of performing dogs can rarely be persuaded to say anything about their craft. No philosophical person, of course, believes in their pretence of possessing "secrets." A necessary part of their business is the assumption of the mysterious. While the intelligent spectator is quite content to admire the results they have honestly achieved, one sitting next to him would think nothing of it if there were not a spice of the wonderful, as he believes, in the method. Indian snake charmers know perfectly well the value to them of this mysterious element in their business, and never fail to insist upon it; though all their trickery has long since been exposed—as I have shown in my "Zoological Notes, page 14 et seq.

Cruelty is no part of the method of the performing dog trainer. Such sensitive animals are merely stupefied by harshness. The men are careful to select promising subjects, and very soon ascertain whether the pupil is worth the labour they intend to expend on him. The strictest discipline is necessary, and enforced by unremitting firmness, but the stories about the use of red-hot irons and other brutal instruments of torture are mere nonsense. Dogs treated cruelly become either fools or savages—in either case worthless for the purpose intended. No particular breed is preferred to another. I have seen a fox terrier, an ugly mongrel of unimaginable parentage, a poodle, and two very well bred setters going through a most intricate performance together, and enjoying it as thoroughly as our own dogs enjoy the daily walk. The poodle is almost always the clown of the company, but the mongrel in this troupe was by far the cleverest. The owner of these dogs told me that he relied very little on imitation when training his pupils. They were taken through their lessons singly, step by step, and usually alone.

The most striking example of the exercise of the imitative faculty I have met with is the following, given me by an old friend, whose dogs have been among the best educated of my acquaintance: "The other day I was endeavouring to teach my Irish terrier, who is rather more than a year old, to hold a crust on her nose, and throw it up and catch it on a signal being given; but she would pay no attention whatever to the lesson. Some week or so afterwards, the retriever, about the same age, was undergoing instruction in the same trick, and made scarcely any progress, in spite of all I could do. Meanwhile, the terrier was intently watching the proceedings; and when I had dismissed the dog, she came up to me spontaneously, and without any invitation from me, and presented her nose in the right position. The crust was placed on it, and, quivering with excitement, she waited for the signal. This having been given, she threw up the crust, and caught it as neatly as any old stager." Properly speaking, this was due to observation, and to reflection on her former lesson, as much as to imitation, and was probably prompted by the spirit of emulation.

It has been observed by travellers that savages, when shown a picture or a portrait of themselves, have sometimes taken no notice of it, as though they did not recognise in it the representation of any object. This has been subsequently found to be merely a pretence, the savage being reluctant to express surprise, or any other feeling, in the presence of the white man. Animals certainly recognise, and are sometimes deceived by, pictorial representations, though they do not always show that their attention has been attracted by them.

I well remember some years ago being much struck by the behaviour of a cat in this respect. I was witnessing the play of "Dan'l Druce," at the Haymarket Theatre. On the left of the stage was the front of a cottage, with a real door, and at its side an extremely well painted casemented window, half open, and surrounded by honeysuckle. One of the performers had just finished a soliloguy, and passed off the stage, through the cottage door, when a cat rushed on to the stage from the right, and, finding its exit barred to the left, suddenly stopped, looked anxiously round, ran up to the window, and attempted to jump upon the sill. She fell to the boards, amidst the laughter and hootings of the audience, looked up again at the window, made one more spring at it, and, being again foiled, dashed off the stage in the direction whence she had come. The cat undoubtedly thought the half-open painted window to be what it represented, and the artificial light may have contributed to the deception. This unconscious testimony to the skill of the scene-painter sinks into insignificance, however, beside the following, which some inveterate joker sent to a London daily paper: "Would you allow me to notice a triumph achieved a few days ago by one of our pavement decorators, well known to London pedestrians? He had just completed a roast beef well under done, when I saw a starving dog lick it, find it to his taste, and try to make off with it. In vain the artist defended his picture with his crutch; the dog licked it clean away. How hungry that dog must have been, or what a rival of Zeuxis and Parrhasius we have in our midst!"

Of more serious interest are two well attested cases given by two correspondents of *Nature*. C. F. Crehore writes:

"A Dandie Dinmont terrier, after the death of his mistress, was playing in a room, into which was brought a photograph (large) of her that he had never previously seen. It was placed upon the floor, leaning against the wall. In the words of my informant, who witnessed the incident, the dog, when he suddenly caught sight of the picture, crouched and trembled all over, his whole body quivering. crept along the floor till he reached it, and, seating himself before it, began to bark loudly, as if he would say, 'Why don't you speak to me?' The picture was moved to other parts of the room, and he followed, seating himself before it, and repeating his barking." P. B. M. says: "I have in my possession a small picture, in which several dogs are represented. A small spaniel was frequently found standing on a chair before the picture, and barking at it; and this was the only picture of which he took any notice."

Mr. Briton Rivière informs me that he has had occasion to observe in dogs a very distinct perception of pictorial representations of animals; and Mr. J. T. Nettleship sends me the following, in answer to my inquiry as to his experiences in this respect: "One Sunday afternoon last November (1883), in clear daylight, my wife and I were sitting in the old studio in Park-road, with half a dozen friends. My wife was seated by the fireplace, to the left as you faced it, and she had in her lap a wire-haired fox terrier, about three About 20ft. distant, at the other end of the studio, stood a couple of portraits (kitcat size, 36in. by 28in.) one, of a girl seated, with a Yorkshire terrier in her lap; the other, of a girl standing, with a black Newfoundland by her Only the head, chest, and shoulders of the Newfoundland appeared in the picture, and neither painting was framed. We were all talking about anything on earth except pictures, when the pup began to growl, and, tumbling off my wife's lap, made towards the two portraits. There was a lion's skin on the floor between him and them, and he got entangled in it, and began to worry it; then he came back, and my wife took him up on her lap again. I do not think anyone except myself noticed him at that moment, but presently he began to growl again, and slid down from his place as before (this time he got over the lion's skin all right), and walked slowly, tail up and muzzle pointing straight for the black Newfoundland. When he got very close to its nose, he turned away, disgusted apparently—his views on art needed expanding!

"Do vou remember how we took in your dog, Carlo II., with the life-sized painting of the black cat lying on a leopard's skin rug, with a brass fender behind? We put the picture (unframed) in among some curtains, so that there was nothing round it to distract the eye. Carlo, on being placed where he could see the painting, paused a moment with cocked ears, and then walked unhesitatingly to the picture, behaving, when he got close, much as the pup did." [Mr. Nettleship has forgotten to say that a Clumber spaniel also exhibited some excitement on first seeing this picture.] "I was once finishing," he continues, "a life-sized portrait of the Lyme Hall mastiff, Lion, now dead, and there was in the studio, at the time, a young mastiff. Away in one corner, but very visible, was a painting of a black retriever. The young mastiff woke from a doze, as he lay in the middle of the studio, raised his head, looked steadily at the picture of the retriever, and growled; then he went to sleep Some time afterwards he woke, and was placed in front of, but at some distance from, the portrait of the mastiff. He was being held in a leash, but he went right at the picture, dragging the man along with him.

"Apropos of dogs noticing works of art not in the animal line, the bull terrier 'Spot,' belonging to your friend Riches, got very much excited over a small plaster cast, about 2ft. high, of the 'Discobolos' (the standing, not the stooping one), which was placed in a corner of the studio. This was towards evening, and the cast shone white out of the corner, but its human shape was unmistakable. The dog worried at

it, and barked at it repeatedly, and was evidently puzzled and scared by it."

Miss Alice M. Chaplin, whose charming terra-cotta groups of kittens at play, and statuettes of the Queen's favourite dogs, have attracted so much interest during the last few years in the Royal Academy exhibition, sends me the following account: "A very sharp little ginger-coloured terrier, Tricksey, came into a room where a drawing, representing a stately cat crouching before a dead bird, had been placed on the floor against a chair by accident. The drawing was in black and white crayon, life size. Tricksey sprang into my lap in a caressing way, and in turning round caught sight of the drawing. She pricked her ears, and, uttering her cat war-cry, rushed towards it, but, coming into collision with nothing but paper, she turned tail, and took no further notice of the drawing."

The above seem to leave no room for doubt as to the identity of the impression made by pictorial and other representations on the mind of the dog, with that conveyed to ourselves by the same objects. Some dogs, however, cannot be induced to express any emotion or, like the savage, they, perhaps, assume the nil admirari attitude of mind, and will not be betraved into any indication of surprise. Individuals among them, too, may be exceptionally observant, and, having quietly compared our paintings and models with their ideas of the real objects, have come to the conclusion that we are trying to hoax them, and refuse to be parties to any insult to their dignity and understanding. "These things are all very well in their way." we may suppose the philosophical dog saving to himself, "but I have taken the measure of them. They may trick my eye for a moment, but they cannot also delude my sense of smell."

The extraordinary liking displayed by some dogs not to any individual master, but to a particular occupation, is one of the most singular traits in canine character, which no other animal seems to exhibit. About twenty years ago, a dog took

the most profound interest in everything connected with fires, and wherever one broke out Bob was almost sure to be at hand. He did not attach himself to any fire station, but went about here and there all over London, getting his bed and board at different stations, always on the look-out for a fire. If he saw an engine galloping along the street on its way to a fire, Bob joined it in high glee, and eventually he became a well-known character in the Metropolis.

A few years ago, I knew a small mongrel whose delight it was to ride with the guards all over the Metropolitan Railway, sleeping at whatever station she happened to be set down the last thing at night. So strong had this habit become, that, as one of the guards told me, when she had a litter of puppies, she wanted to carry them all right off into the train; but, as this was prevented, she took long rides in the intervals of suckling her young. A bull terrier of my acquaintance took a fancy to riding all over the north of London on tramcars, sometimes passing the whole day in this manner, going from one car to another. Often, even when out with his master, Spot would be fired with excitement on hearing the tinkle of the bell, and jump up beside the driver. with whom he would ride to the end of that journey, then taking another car in some other direction. Thus he became a well-known character and a great favourite with the men on the suburban lines. Although Spot kept very late hours, his master had no fear for his safety, for he seemed to know his own business thoroughly. Dogs who behave in this way must have a strong spice of vagabondism in their nature; or is it, perhaps, comparable to the sense of duty we feel in our own avocations in life?

An instance of this peculiar interest in the occupations of man, rather than in the human creature himself, occurred in my own family. Dash, a large Newfoundland bred dog, had a singular passion for attending funerals. My father was incumbent of a small living in a village of about a

thousand inhabitants, and Dash had attached himself solely to him, accompanying him on his parochial visits, and being a favourite everywhere with the villagers. He had no great disposition for going to church on Sundays, though one afternoon he walked quietly down the aisle, ascended the pulpit stairs during the sermon, and sat smiling at the congregation, from the topmost step, my father being quite unconscious of his presence. Still no one felt disconcerted. He seemed quite in the proper place wherever his master might be. But no funeral was complete-so Dash thought -without his attendance, and the unsophisticated villagers appeared to consider the constant companion of their minister quite entitled to take his position at the head of the funeral procession. Nature, moreover, had endowed him with the means of appearing in suitable dress; for his "customary nuit of nolemn black" was appropriately set off by a white patch on his chest, which did duty very well for a shirt front. His first attendance at a funeral happened accidentally. had escaped from control at home, and when my father came out of the church, reading the service, at the head of the procession, Dash walked from the vestry door, where he had been lying, and marched decorously down the churchyard to the grave a few paces in front of my father, who, seeing that nothing could then be done, left the dog to his own devices. When the coffin arrived at the grave, Dash lay down at the end opposite my father until the conclusion of the service, when he walked slowly back in front of his master to the vestry door. There had been nothing whatever to shock the sense of decorum in any one present. It had all taken place so naturally. The dog himself seemed to realize the solemnity of the occasion; and those who had been accustomed to him lying by their own cottage fires, during the visits of their parson, had no thought of resentment at his presence beside the graves of their dead. Thenceforth, Dash attended every funeral, always going through precisely the same routine, except that he changed his first place from the

vestry door, and waited at the porch of the church to take up his position at the head of the procession.

The interest of the dog was certainly bound up in some way with the funeral, apart from his natural desire to be with his master. When a stranger took the duty once for my father, during a few weeks, Dash attended the funeral of an old parishioner that took place in the interval, and behaved in exactly the same manner. Dash knew as well as anybody the day on which a funeral was to be. The house was about a quarter of a mile from the church, and whenever he heard the tolling of the bell, he went, in a state of excitement, to his master's study, and barked with delight until he was outside the gate on the way to the church. Then his manner changed to that of solemn decorum, maintained until the termination of the proceedings.

As in all small villages, the carpenter of the place was also the undertaker; and this man, with whom the dog was familiar, as the chief official at all funerals, told me that Dash would often look in at his shop for a few minutes, and then walk out again; but if a coffin was in course of being made, he would remain a long time, watching the work with much apparent satisfaction, doubtless in anticipation of another of those events which constituted the absorbing interest of his life.

Some of my readers may perhaps be disposed to question the possession by the dog of a moral sense, but I am afraid there are those who are "very fond of a dog in his proper place"—which means a kennel, in a yard, with the depressing prospect of four blank walls and a stable broom—and who always address him, in a tone of kindly but contemptuous patronage, as "poor fellow." They, unhappily for them, do not know what a dog is. A creature so "cribb'd. cabin'd, and confin'd" becomes as dull, and often as vicious. as a galley slave. Indeed, we cannot put so high-spirited an animal to a worse or more cruel use than to impose on him any of the indignities of bondage. His manners and morals

are derived from association with man, and he cannot acquire either without constant companionship with his master, and this on terms of equality. No one who has not thoroughly respected his dog has ever had a dog worthy of respect and esteem, nor can he know what such a one is. When I perceive in this animal, and in this alone to any marked degree, the same moral qualities as I observe in my fellow man—when I know that he will cheerfully endure suffering, and go joyously to death even, for my sake—I am content to accept these acts as the expression of a moral character.

High as are the merely mental faculties of the monkey, he is almost devoid of the moral sense as we find it in the dog. Darwin, in his "Descent of Man," has shown how this sense is primarily derived from the social instincts. In its most elementary form, it is expressed by pleasure in the society of our fellows, by sympathy with them, and the disposition to render them various services. Trivial examples may help to show this, as when a horse, irritated by a gadfly on some part of his body which he cannot reach, goes to another, and nibbles him on the corresponding part. horse receiving this intimation of discomfort, almost always immediately nibbles the sufferer on the same part, and we may see cattle scratching one another with their horns. One of my dogs making fruitless efforts to scratch himself, on account of a wounded and bandaged foot; the other understood his difficulty, and set to work to nibble him for several minutes about the spot, much to the gratification of the sufferer. No candid mind can doubt that these actions represent that spirit of benevolence which, when very highly developed, prompts us to the care of the sick, and to the most heroic actions in the cause of humanity. has a strong tendency to confirm and extend these actions. and to render them instinctive, and then a sense of dissatisfaction is experienced when they are not performed, just as is the case with all other instincts.

These impulses, stirring in animals, though much more

feebly than in ourselves, lie at the foundation of the moral sense, whose varied manifestations consist mainly of extended and diversified forms of the principle of sympathy. The dog, having for so long enjoyed the advantage of association with the most social of all animals—man—in whom the social instincts have given rise to the most highly developed moral instincts, has had opportunities such as no other community could have afforded of being brought under the influence of everything we understand by the moral sense. Hence his great superiority, in this respect, to the members of all other animal communities, however strong may be the bond of social union between them.

It would not be easy to find a more convincing instance of benevolence than the following, communicated to me by my friend, Mrs. S. D. Delmard, a careful and critical observer of animals: "Some years ago, when living in Switzerland, I had two female dogs, Lionne, a St. Bernard, and Lulu, a little Pomeranian that I had brought from Wurtem-Lionne, like most of her breed, was lazy, easy tempered, and rather stupid; while Lulu was the most excitable, jealous, intelligent, and, to her own kind, exasperating dog I ever knew. Lionne was Lulu's especial aversion. The very sound of her footsteps made Lulu almost frantic, while a meeting between the two, notwithstanding the forbearance of Lionne, was almost sure to terminate in a quarrel. Both presented us with their first litter of puppies in the course of the same night-Lulu making her bed on our large balcony; and Lionne, doubtless from a desire to be away from wars and rumours of wars at such a time, established herself in a large old kennel she had discovered in a field at the back of the farm buildings belonging to the house we occupied. Of Lionne's thirteen puppies, nine were drowned; but Lulu's less numerous family of seven were all spared, because they were of pure breed, which the others were not. To our sorrow, however, it soon became evident that their little mother had not sufficient milk for them, while Lionne was so bountifully supplied that it ran from her as she walked. We tried every means we could devise to feed the starving little ones, but in vain; and, on the seventh day after their birth, as we sat on the balcony, watching their painful, ineffectual efforts to satisfy their hunger, Lulu, apparently losing all patience, sprang up, stood for a few moments, gazing at her whining offspring, and then trotted briskly along the corridor down the stairs. Peeping over the balcony, we saw her go out of the house, and turn round the corner of the building, in the direction of Lionne's kennel. In less than a quarter of an hour, she returned the way she went, followed by Lionne, whom she led towards her still whining puppies. For a few moments, the St. Bernard seemed puzzled, but an impatient bark from Lulu was evidently sufficiently explanatory, as she immediately lay down by the side of her enemy's young, and suckled them for full half an hour-Lulu meanwhile retiring to a corner, whence she kept a watchful eye on the proceedings. When they had had enough. Lionne got up, Lulu accompanying her to the top of the stairs, to see her off the premises."

"The same proceeding in every detail—save that in a few days Lionne came of her own accord—was continued twice a day, morning and afternoon, for a month, when, the puppies being able to lap, Lionne's visits abruptly ceased. In justice to Lulu, who was my faithful companion for thirteen years, I must mention that, although her friendship for her children's wet-nurse never reached the 'gushing' stage said to be characteristic of her sex, she ever afterwards refrained from any overt act of hostility towards her benefactress. Besides my own family, many neighbours in Bex were witnesses of this pleasing spectacle."

Criminal justice, as administered by the laws of human communities against evil doers, is considered in all advanced civilisation to be directed towards the prevention of crime in others rather than to the punishment of the individual offender. The members of the community have collectively agreed to

forego all personal retaliation for injuries sustained and delegate the infliction of punishment to the body politic. This is no doubt an enormous advance on the barbarous principle of "an eye for an eye and a tooth for a tooth," and marks a most important step in the evolution of human morals. Still, there are many well-dressed and educated people among us who cannot think of an execution without a feeling of gratification hardly distinguishable from the savage instinct of personal vengeance, even when the murderer is totally unknown to them. We see the same spirit in those occasional outbursts of savagery called "Lynch Law." The primitive impulse in man to inflict, by his own hand, a corresponding or equivalent injury on one who has wronged him cannot be entirely dispensed with. It is necessary to the survival of the individual. Retribution, then, is the first step in the dealings of man with man on which our entire ethical system of abstract justice is founded.

It would be easy to show how, in many classes of animals, there is an incipient advance beyond the principle of personal retaliation. One intensely hot day in the summer of 1884, I was lying in the shade, watching a troop of horses greatly tormented by the flies. Among them was one individual of aggressive disposition, who would quietly walk up and give one or other of the troop a sharp nip with his teeth. full half an hour this went on, until probably most of them had suffered from the annoyance. At first the individual attacked had to deal retributively with the matter unassisted; but at length a sort of public opinion seemed to have been formed, and four or five of the troop attacked the offender simultaneously, and drove him out from among them. After this he did not return. No one will suppose that any idea of abstract justice was involved in this, but it was a clear case of the community, or a section of it, acting against one of its members in the common interest—the first step in a judicial system; and by no other gradations can one conceive a human community rising to the comprehension of the moral

effect of punishment. The student of the history of human progress can find, all along the tedious road, landmarks of great significance—such as the Roman lex talionis and our modern expression "the vengeance of the law"—which indicate the primitive necessity, common to us and animals, for resisting wrong, oppression, and violence. While these terms remain on our statute books, and are daily in the mouths of our judges, it may be well to reflect how closely our morality was once comparable to that of the higher animals. and also to that of the lowest savages, from whom we in England are removed by at most twenty centuries. When, then, a dog bites a man who has beaten him without sufficient cause, he must have a perception of the necessity for self-protection in the first place, and a sense of the injustice of the act stirring, however feebly, in his breast: that is to say, he experiences that sense of disproportion or disturbance of right relationships which we ourselves feel. If so, it is absurd to deny him a moral sense when we claim it for ourselves.

I should not have ventured to inflict this metaphysical disquisition on the indulgent reader had I not been able to offer him a case in point, given me by a gentleman-Mr. J. A. Gibbs—on whose accuracy of statement I can, from personal acquaintance, fully rely. The dog was an extremely quiet animal, devoted to the family, the playmate of the children, and particularly attached to the infant, beside whose cradle he would lie for hours, almost disregarding his master's invitation to go for a walk. "Some years ago," writes Mr. Gibbs, "I had a married sister living at Sudbury, near Harrow, whose husband was a breeder of horses and had an establishment for the purpose adjoining his house. He contemplated some alterations in the premises, and wished to borrow my black retriever, Carlo, owing to the number of workmen about the place. The dog and I had been, in a sense, inseparables, and I did not altogether like lending him. For the first time, as a daily habit, Carlo found himself chained up, being released

when the men left off work, to have the run of the outbuildings for the night. One day, when the dog was on the chain, a young groom named Jessop persistently irritated the dog by pushing his paunch towards him and pulling it away again with a broom, until at length he refused to eat, and lay down sullenly in his kennel. When he was at length released in the evening, he somehow managed to get out of the premises, probably by jumping the paddock gate. Later on, my brother-in-law was told by a visitor that one of his men had been dreadfully bitten and half killed by a ferocious dog. An eye-witness, describing the occurrence, said that Jessop and he and two or three friends were drinking in 'The Chequers,' a public house near the station, when the door was pushed open, and a dog looked in and forthwith flew upon Jessop, who was completely unable to defend himself, and savagely tore him about the hands, face, and inside of the thigh, the last being a terrible wound. It was with great difficulty that he was got off and immediately shot. My brother-in-law had to pay a bill of £25 and £50 compensation, as nervous prostration When the facts of the case became known, it was said by a beerhouse keeper at Harrow that during the evening he saw Carlo-whom he knew-look in at the tap-room and subsequently run out, evidently in search of someone, and accurately estimating the likeliest kind of place to find his enemy. He was a most docile creature, and I deeply deplore what I considered at the time little less than his assassination."

At first, one would be apt to consider the provocation here quite inadequate to bring about such serious consequences; but do we not all know what vast proportions a wrong brooded over assumed when we were children? Children of tender years have frequently gone out, smarting under the sense of injustice, and drowned or hanged themselves, or set fire to the house, and others have committed murder when labouring under an exaggerated and distorted impression of the conduct of some playmate.

Conscience is, perhaps, the highest expression of the moral sense, and if it does not exist in animals, it is impossible to account for some of their actions. Darwin says: "Besides love and sympathy, animals exhibit other qualities which in us would be called moral; and I agree with Agassiz, that dogs possess something like a conscience." In this connection I cannot refrain from quoting an instance from a delightful article "On the Moral Advantages of Keeping a Dog," by Colonel R. D. Osborn, published in a weekly periodical now out of print. Master Jock Elliott was the name given to a black wiry-haired terrier who had taken up his quarters, unbidden, in Colonel Osborn's family. "Until his domiciling with us." he says, "his life had been predatory, and his notions as to property, and the distinction between meum and tuum, exceedingly lax; he became aware of a new law of life when he got his dinner regularly at a fixed hour every day. At this stage of his career a psychologist would have found in him an admirable subject of study. There might be discerned the perception of an external law gradually transforming itself into a law of the conscience, which Jock Elliott, unfamiliar with philosophical abstraction, assumed to be innate to the dog nature; at any rate, the fact that he had become the possessor of a conscience revealed itself to Jock in this wise. We had been at supper, and there had been left a small piece of cold tongue. Jock saw and coveted this piece of tongue; in his predatory days he would have effected its appropriation without any other sensations than those of enjoyment and contentment; wherefore should be feel otherwise now? So, I doubt not, Jock reasoned within himself, not knowing what manner of dog he had become. At any rate, when we had left the supper-room, Jock stole back, intent upon devouring that relict of the cold tongue. He ascended the table; he got the tongue into his mouth, when his newly developed conscience suddenly asserted its presence. He was overwhelmed by the enormity of his crime. He could neither eat the tongue nor drop it. And so, in extreme perturbation of spirit, he

came into the sitting-room, deposited it at the feet of his mistress, and crawled off, the most dejected and remorsestricken dog it was possible to imagine."

Who among us cannot remember a period in our own childhood when our moral sense was less highly developed than that of humble Jock Elliott? Who cannot call to mind occasions when, with fingers in the sugar basin or jam pot, we ate of the forbidden fruit stealthily, undeterred by any selfreproaches that ought to have stirred within us?

How is it that a dog, when well treated, so seldom steals food, even when it is constantly within his reach? The cat seldom or never refrains, and will bide its time with all the patience of the savage for a raid upon the table or the cage of the pet canary. One of my retrievers once committed an act of petty larceny, of which, I trust, he sincerely repented. Hector and Carlo used to wait in the breakfast-room while I finished dressing. One morning I came down and found them both, as usual, expecting me. The landlady came in to set the table, and, on looking into a low cupboard, the door of which was open, exclaimed, "Why, good gracious! the dogs have had the beef: here's the empty dish. The meat was there ten minutes ago, when I poked the fire, and nearly a whole 2lb. tin of that beautiful Australian corned beef that I turned out for your breakfast yesterday has gone." Which was the culprit?

There was nothing in the manner of either to arouse suspicion. I made them both sit down in front of the cupboard, held the empty dish before them, and lectured them seriously on their wickedness. Just a slight tremor in Hector's massive frame, and an inclination to avert his eyes from the cupboard, then became "confirmation strong as proofs of holy writ"; while Carlo wagged his tail, and looked innocently from the dish to my face. I sat down by the fire, took up the newspaper, and waited for the frying of a couple of eggs in place of the lost beef. In a few minutes Hector stole out of the room unnoticed, and from the passage came that unearthly sound which accompanies the regurgitation of food from a

dog's stomach. I rose, more in sorrow than in anger, to ascertain the cause. There sat Hector, gloomily gazing at a heap of undigested meat on the oilcloth in front of him: the veritable Australian corned beef! Was it, think you, the "still small voice" of conscience that brought his crime to light; or, haply, was it the irritating effect on his stomach of the salt in the meat? That secret lies buried with the noble old doggie in his grave under the spreading chestnut tree at Hendon. Requiescat in pace!

Have dogs a sense of humour? I have not been able to discover any sign of it; but my own dogs have all belonged to the retrieving profession, and were duly impressed with the gravity and sense of responsibility of their calling. The late Dr. John Brown, of immortal memory, said: "I have a notion that dogs have humour, and are perceptive of a joke. In the north a shepherd, having sold his sheep at market, was asked by the buyer to lend him his dog to take them home. 'By a' manner o' means; tak' Birkie, and when ye're done wi' him just play so (making a movement with his arm), and he'll be hame in a jiffy.' Birkie was so clever, and useful, and gay, that the borrower coveted him; and on getting home to his farm, shut him up, intending to keep Birkie, however, escaped during the night, and took the entire hirsel (flock) back to his own master." own part I am not so fortunate as the Scottish judge, who cogitated all night on a joke he heard in Court, and when the point of it suddenly broke upon him at dawn, ejaculated with solemn satisfaction: "I have yo noo!" Possibly the considerable infusion of Scottish blood in my own veins blunts my perception of humour.

Bacon thought, or affected to think, wit and the sense of humour no very great ornament to the human mind, or evidence of intellect, so that I am not much concerned at the lack of it in my dog. There have been few keener observers of the character of animals than James Hogg—"the Ettrick Shepherd"—and I am therefore well content to let him lead

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me captive on this matter by the account he gives of his favourite colley: "It's a good sign of a dog when his face grows like his master's. It's a proof he's ave glow'ring up in his master's een to discover what he's thinking on. Hector got so like me afore he dee'd that I remember, when I was owre lazy to gang to the kirk, I used to send him to take my place in the pew, and the minister never kent the difference. Indeed, he asked me next day what I thocht of the sermon; for he saw me wonderfu' attentive amang a rather sleepy congregation. Hector and me gied ane anither sic a look! We was like to split; and the dog, after laughing in his sleeve for mair than a hundred yards, couldn't stand't nae longer, but was obliged to loup awa owre a hedge into a potato field, pretending to scent partridges." Such excellent fooling may almost persuade us of the existence of a sense of humour in a Scot's dog, and even in the Scot himself!

However closely some animals may approach the dog in intelligence alone, none other has ever laid down his own life through very weariness of existence when the bond between himself and his master has been severed by death, or has sacrificed his life in the endeavour to preserve that of his The well-attested cases of dogs refusing food, and pining to death at the graves of their masters, evince a depth of sympathy uncommon even in human beings. Landseer has embodied this finely in his pathetic picture of "The Shep-Who but he could have so truly herd's Chief Mourner." depicted the expression of grief on the countenance of the colley, sitting with his head laid on his master's coffin? Ben Jonson refers to this undying attachment when the body of Sejanus was cast into the Tiber by order of the tyrant Sabinus:

His faithful dog, upbraiding all us Romans,

Never forsook the corpse, but seeing it thrown

Into the stream, leaped in, and drowned with it.

—Sejanus, Act IV., Sc. 5.

In the Dundee Advertiser, some years ago, the following

appeared: "A striking example of that devotedness and faithfulness characteristic of the canine race may be witnessed at the door of the Dundee prison, leading from the police office. At the police court, on Saturday, John Melville, a shepherd, was sent to prison for seven days for drunkenness. The shepherd possessed a beautiful colley, which patiently waited upon its master during his trial. On leaving the bar and being marched to prison, the faithful animal followed, and would willingly have shared a corner of his master's cell had it been permitted. The good dog, being necessarily separated from its master, would not, however, desert his place of confinement, but took up a position at the prison door, where it still keeps 'watch o'er his lonely cell.' Meat and drink were laid down to it by one of the police officials, and some time afterwards another supply was brought, when it was found that the poor brute had not even tasted the first, and no coaxing could induce it to do so; neither can it be induced to accept a warmer and more comfortable place."

His drunkenness notwithstanding—and perhaps the Scottish magistrates did not take too lenient a view of the failing—that shepherd must have been a good man to his dog; for, though their forgivingness towards those they love is much greater than that of average men, dogs may be alienated by harsh treatment as certainly as ourselves. A blow unjustly given by one hand may be forgiven after a caress from the other, but a dog betrays by his demeanour to the observant eye the character of his master. We know at once whether he is the trusted friend or merely the slave of the man. In the former case there is confidence in every glance; "he is aye glow'ring up in his master's een," as Hogg says; whereas, in the latter, he shrinks from looking at a countenance on which he seldom sees any expression except that of anger.

A human being who has not at some period of life enjoyed the friendship of a dog has missed one of the most humanising of all influences. Almost all the best men and women I have known were indebted to association with their dogs for much

of that which is best in their character and disposition. is no small matter that we have always before us a picture so beautiful as even an ugly dog is in his graceful poses and movements, and his simple, unaffected manners. Our sense of right and justice, too, is perpetually exercised by thoughtful consideration for his needs and pleasures—in supplying him with his food and water and taking him out for his walks. That going out for a walk is the supreme moment of his day. How often will his delight re-act upon us by sympathy, dispel gloomy thoughts, and win us to a cheerful mood! Let me counsel all who keep a dog-or dogs-to cultivate this simple source of genuine enjoyment, even at some sacrifice of convenience. An outing twice or thrice a day is a physiological necessity for a dog. Every large dog ought to have at least four miles of walking exercise daily, and every small one would be the better for so much, and more. It is an excellent remedy for depression of spirits to cultivate the habit of entering into the sense of freedom he feels when he bounds towards the door in anticipation of that daily pleasure which never palls upon his simple mind. Those who have succeeded in this-and the habit soon grows-are among the relatively happiest of human beings. They have, at all events, one more source of pleasure than others who do not keep a dog.

But more than this, it is in our power to confer lifelong happiness on a being whose gratitude is boundless, and to enjoy the only unalloyed pleasure we can experience—the consciousness of having thus rendered some creature as happy as we possibly can.

CHAPTER VII.

Representatives of the Fossil Carnivora.

THE true carnivora are, palæontologically speaking, comparatively recent; but in Triassic times existed in Europe and America marsupial forms of carnivorous, or, at all events, insectivorous habit, allied to the present Australian dasyures and thylacines, whose dentition was of so peculiar a character that it almost entitles them to be placed among the true carnivores. The two great families of Felidæ and Canidæ seem to be the earliest known, appearing as they do in the Eocene rocks; though, since they were then already differentiated, they certainly cannot represent anything nearly approaching to the ancestral carnivorous form. break in continuity between the Secondary and Tertiary formations may, perhaps, for ever preclude us from knowing what the carnivorous archetype was. The group, however, must have had a great development and wide distribution long before the period at which our acquaintance with it begins; for nearly all the principal families are represented in the Meiocene and Pleiocene of Asia and Europe, and are probably in greater force than ever at the present time. Asia-whether or not it was the original birthplace of these forms—is peculiarly rich in fossil examples. Thus, in Series X. of "Palæontologica Indica," vol. II., part 6, edited by Mr. R. Lyddeker, B.A., F.G.S., &c., thirty-three species from the Meiocene and later rocks of the Siwalik hills are described, belonging to the families of Felida,

Ursidæ, Hyænidæ, Viverridæ, Mustelidæ, and the extinct Mr. Lyddeker considers the relationship of Hyænodontidæ. the bears and dogs to be so close as to render their separation unnecessary, at least for palæontological classification, and he, therefore, includes them in the Ursidæ. respect to the cradle of the hyænas, he inclines to the opinion that it was Asia rather than Africa. These Siwalik Hills furnish two species of Machairodus (the sabre-toothed lion, or tiger), which also had a wide European range, and survived at all events to palæolithic times. From a consideration of these extinct Asiatic carnivorous types, and comparing them with some still remaining in the same area, some of these ancient forms would appear to have survived in India long after they became extinct elsewhere. These Siwalik fossils occur in conglomerates of fresh water origin, generally speaking of Pleiocene age, and associated with them are the remains of an immense herbivorous fauna. both proboscidean, cervine, bovine, and suine, affording food for their numerous and powerful predatory contemporaries. Other early extinct genera of Tertiary age are Deinocyon, Arctocyon, Amphicyon, Simocyon, Hemicyon, Cynodon, and Cynodictis, mainly of canine type; and Hyanodon, Eluropsis. Elurogale, and Pterodon, allied to the feline families—some even presenting marsupial characters in their dentition, and otherwise suggesting affinities with that peculiar and specialised order.

Some extinct species were far more formidable than any now surviving. A remarkable and aberrant form is the genus *Machairodus*, or *Drepanodon*, which ranged from India through Italy, France, England, the Pampas of South America, and Brazil. This powerful lion (or tiger) carried in the upper jaw a pair of blade-like canines, from 4in. to 6in. or more in length, serrated along their inner edges. The extraordinary length of these teeth suggests the question whether the gape of the jaw would be wide enough to enable their owner to take in anything of large size, for there would be but a few

inches between their points and the lower teeth when the mouth was wide open; but it is not impossible that they were used like tusks for striking a terrible downward blow, to which their shape would well adapt them. A fine cranium of one species, *M. Latidens*, from the La Plata, is to be seen in Wall-case, No. 1 (south side), in the geological collection at the Natural History Museum, South Kensington, with these teeth well preserved; and in the same gallery most of the fossil carnivora to be subsequently mentioned are represented.

There seems little reason to doubt that the man of the palæolithic period may have been familiar with this feline monster, and also with the great cave bear, Ursus spelæus; the cave lion. Felis spelæa; and the cave hvæna. Hvæna spelæa. The bear was as formidable as the existing "grizzly" of America, the lion of larger proportions than either the Asiatic or African species of our time, and the hyæna on a larger scale than existing species. In all the principal caverns the presence of the hyæna may be distinctly traced by the bones of herbivora gnawed in a manner characteristic of his living congeners, and by his own remains. The wolverine, or glutton now an Arctic species, extended into central France, and smaller species, such as the otter, weasel, &c., were represented in Meiocene times. Species of Canis, too, appear in the gypsum of Montmartre, showing that this form was early differentiated; while a wolf, closely similar to Canis lupus of our time, has been found in the Cromer forest-bed, associated with extinct proboscideans.

Inasmuch as this forest-bed is certainly pre-glacial, the lupine form was already in being, at least as early as, and even anterior to, the period at which the human race had become so far differentiated from its ancestral form as to be entitled to claim the rank of *Man*. We cannot know whether the men of the drift period domesticated it; but this may be assumed with some confidence, that, surrounded as they were by ferocious carnivora, and living solely by the chase, beings intelligent enough to manufacture stone weapons would not

have overlooked the advantage of securing the help of so valuable an animal. That the men of the palæolithic and neolithic periods were not without a canine companion can scarcely be doubted, though the direct evidence of this is scanty.

From the above it will be seen that the true carnivora are comparatively recent (i.e., so far as we know, not older than the Eocene), though they may have appeared in that period represented by the geological hiatus, between the Secondary and Tertiary formations. Since their appearance they have increased in families and genera, and now may probably be considered at their maximum of specialisation. The influence of man, however, is assuredly destined to extinguish all except a few forms useful to him, and one of the survivals under domestication is certain to be the genus canis.





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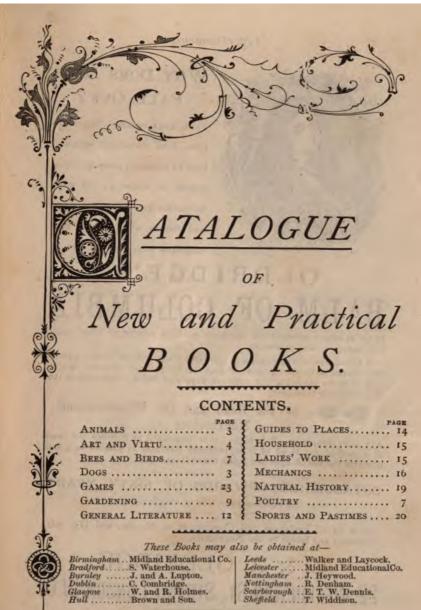
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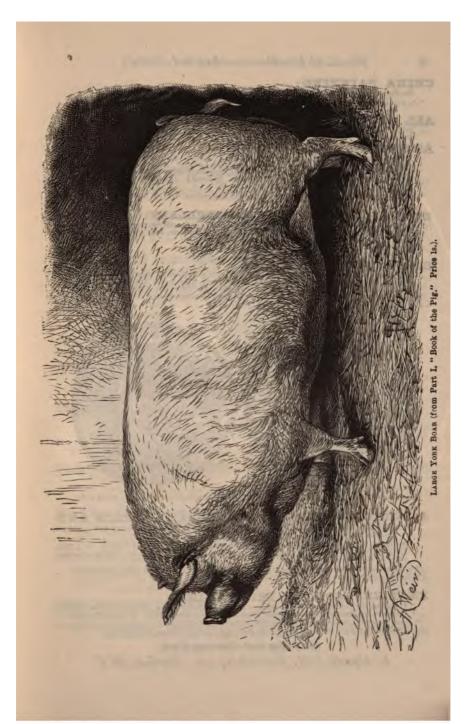
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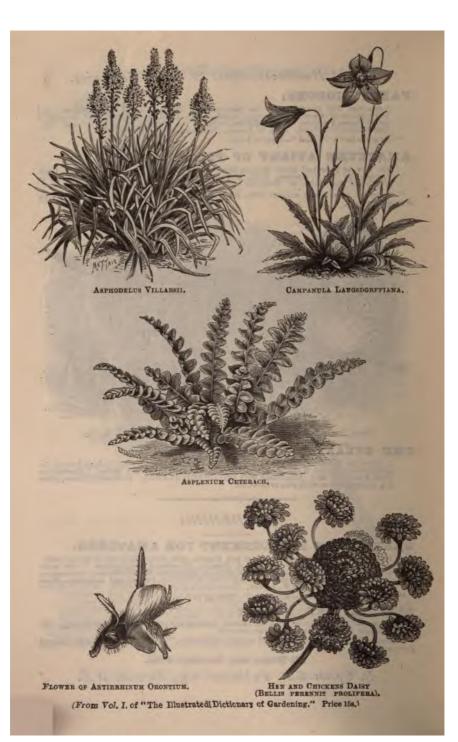
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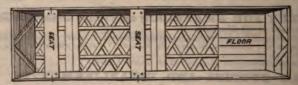
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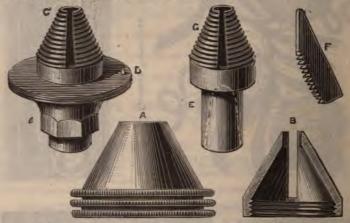
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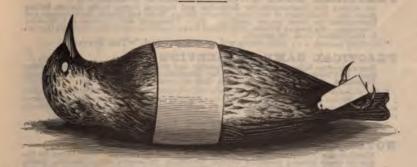
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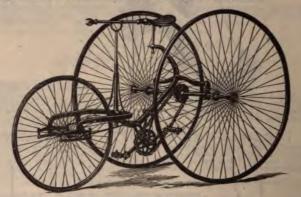
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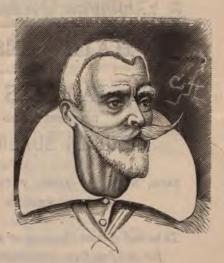
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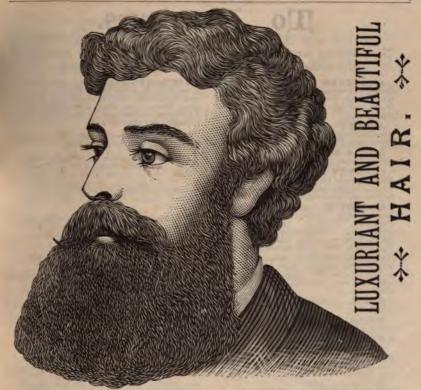
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